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Scaling up diversity to scale up nutrition

Nutrition behaviour and effective interventions for women and infants in Zambia and Togo

Martin Thomas Schlecht, Sascha Berndt, Josefine Greber, Jan Marinko, Ukeme Okon Archibong , Anja Schmidt, Carolin Speckhahn, Hanna Weinsheimer

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SLE Postgraduate Studies on International Cooperation for Sustainable Development

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Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

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Preface

For 57 years, the Centre for Rural Development (SLE) at the Humboldt-Universität zu Berlin has trained 20 postgraduates annually to become professionals equipped with excellent knowledge and skills in the field of German and international development cooperation.

Three-month empirical research projects conducted in cooperation with German or international development agencies form an integral part of this one-year course. Participants work in interdisciplinary teams supervised by experienced team leaders and carry out innovative, future-oriented research on development problems that prevail on the ground on a local or national scale. This strengthens global knowledge and provides partner organisations in the host country with strategies and tools. Here, it is vital to involve a wide range of actors in a process, which includes surveys and consultations at the household, expert and policy levels.

Most studies refer to rural (or urban) development themes and have a socio-economic focus, such as the enhancement of agricultural livelihoods or the design of regimes to manage natural resources sustainably. Up to now, our partner countries have either been developing or transformation countries, and occasionally fragile states. In the future, however, studies may also take place in the global north, since the Sustainable Development Goals (SDGs) are a global concern. Some studies develop new methodologies, published in handbooks or guidelines. Further priorities are evaluations, impact analysis and participatory planning.

Throughout the years, SLE has carried out more than 200 cooperation projects in over 90 countries. This series publishes the results.

The present study on food and nutrition security in Zambia and Togo was carried out in cooperation with the GIZ/FANSER in Zambia, GIZ (GFA) ProSecAl in Togo and with the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in Bonn, Germany.

We wish you a stimulating read.

Yours sincerely,

Prof. Dr. Bernhard Grimm
Dean of the Faculty of Life Sciences
Humboldt-Universität zu Berlin

Dr. Susanne Neubert
Director of the Centre for Rural Development (SLE)

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In **Zambia**, we received tremendous support from the GIZ office in Lusaka and the regional office in Chipata. The whole GIZ provided us great logistical and administrative support and great insights and advice on the topic. Sincere thanks also go to our wonderful Zambia research team from University of Zambia (UNZA) and our scientific cooperating partners from Indaba Agricultural Policy Research Institute (IAPRI). Dr Rhoda Mofya-Mukuka and Jairos Sambo (IAPRI) greatly supported us with scientific and regional advice, logistics and dedication during data analysis. Without the commitment and hard work of Kennedy Chilimboyi, Charles Mwamba, Japhet Mutunga, Augustine C. Kaunda, Isabel Sakala, Brenda Makamba, Musanda Ngulube, and Mungaila H. Moment the team would not have been able to conduct our household interviews and focus group discussions and gain such deep understanding of smallholder farmers' living realities. Furthermore, we want to thank all staff and volunteers from CRS and Care international, for their time and dedication allocated to us and for allowing us insight into their work in Eastern Province.

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Most importantly, our cordial thanks and sincere gratitude go to all farmers and families, volunteers and staff in the project regions, not forgetting the agencies and organizations at provincial and national levels, who provided us with their expert knowledge and insights. We truly hope this study benefits the knowledge on food and nutrition security in both project regions and can contribute to the wellbeing of the target group.

Also, we do not want to forget to thank Dr. Robert Rudolf and Dr. Christoph Klotter for the scientific and professional support in the analysis of the data.

Furthermore, we would like to thank all other individuals and organizations who provided tireless support and guidance to the study through their invaluable advice and comments in preparing and implementing the study. Special thanks go to the director of the Center for Rural Development, Dr. Susanne Neubert and also to Dr. Karin Fiege as well as other staff members for their great support throughout the study.

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Abbreviations

7NDP	7th National Development Plan (Zambia)
AE	Animateur endogène (Togo)
ASC	Agent de santé communautaire (Togo)
AT	Animateur technicien (Togo)
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
CAADP	Comprehensive Africa Agricultural Development Program
CARE	International NGO, implementation partner of FANSER
Credi	Local NGO, implementation partner of ProSecAl (Togo/Vo)
Crema	Local NGO, implementation partner of ProSecAl (Togo/Yoto)
CRS	Catholic Relief Service, implementation partner of FANSER
CTA	Technical Centre for Agricultural and Rural Co-operation
DNCC	District Nutrition Coordinating Commission
DRS	Direction Régionale de Santé (Togo)
FANSER	Food and Nutrition Security in Zambia
FGD	Focus Group Discussion
FISP	Farmer Input Subsidy Programme (Zambia)
FNS	Food and Nutrition Security
FRA	Federal Reserve Agency (Zambia)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GNI	Gross-national income
GRZ	Government of the Republic of Zambia
HSA	Health Surveillance Assistance (Zambia)
HFIES	Household Food Insecurity Experience Scale
IAPRI	Indaba Agricultural Policy Research Institute (Zambia)
ICAT	Institut de conseil d'appui technique (Togo)
IDDS-C	Individual Dietary Diversity Score for Children
IDDS-W	Individual Dietary Diversity Score for Women
IPA	Innovations for Poverty Action
ITRA	Institut Togolais de Recherche Agronomique (Togo)
KI	Key informant
MAD	Minimum Acceptable Diet
MCDP I	First 1,000 Most Critical Days Programme
MCDP II	Most Critical Days Programme II
MDD	Minimum Dietary Diversity

MMF	Minimum Meal Frequency
Mopib	Local NGO, implementation partner of ProSecAl (Togo/Bas-Mono)
NAP	National Agricultural Policy (Zambia)
NBST	Nutrition Baseline Survey Togo
NBSZ	Nutrition Baseline Survey Zambia
ND	New Castle Disease
NCC	National Nutrition Commission
NCD	Non-communicable disease
NFNC	National Food and Nutrition Commission (Zambia)
NFNSP	National Food and Nutrition Strategic Plan (Zambia)
NTFP	Non-timber Forest Products
OFSP	Orange fleshed sweet potatoes
ODA	Official development assistance
PICS	Purdue Improved Crop Storage
PRA	Participatory Rural Appraisal
ProSecAl	Programme Securité Alimentaire (Togo)
RDA	Recommended daily allowance
SBCC	Social Behaviour Change Communication
SDG	Sustainable Development Goals
SLE	Centre for Rural Development
SNAP	Second National Agricultural Policy (Zambia)
SUN	Scaling Up Nutrition (-Movement)
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNZA	University of Zambia
WASH	Water, Sanitation and Hygiene
WNCCs	Ward Nutrition Coordination Committees
WFP	World Food Programme
ZICTA	Zambia Information and Communications Technology Authority

Executive summary

Rural households in Sub-Sahara Africa have alarming rates of under- and malnutrition. One severe consequence of early malnutrition is child growth stunting. Political bodies and national and international organisations on all levels call for the end of all forms of hunger and malnutrition by 2030. Aiming at the reduction in child stunting and at improving the nutrition situation of rural households, the German Federal Ministry of Economic Cooperation and Development (BMZ) launched the One World – No Hunger initiative (SEWOH) to contribute to the second UN sustainable development goal (SDG 2). The SEWOH initiative is implemented in 11 countries. The target group of the programme are women of childbearing age and small children. In the two project regions of this study, Togo's Maritime and Zambia's Eastern Province, rates of stunting are above the national level and alarmingly high (29 % in Maritime and 43 % in Eastern Province). In Zambia, the FANSER-programme, and in Togo the ProSecAl programme implement a multi-sectoral set of interventions to address food and nutrition security.

The economies of both project areas are heavily reliant on small-scale agriculture. Households mainly cultivate staple crops such as maize. Until today, they face difficulties to achieve food and nutrition security through their own production. In both areas, food and nutrition insecurity follows periodic cycles along the agricultural production system and find its peaks during the so-called "hungry season", i.e. the weeks before the next harvest. The annual reoccurrence of the hungry season illustrates that households, besides diversity, lack quantity of their agricultural production. This is not only due to low yields but also to high production risks of staple crops and structural and marketing problems. In both countries, national agricultural and nutrition policies do not show the desired effects in the reduction of stunting.

Research objectives

This study sets out to get a better understanding of the determinants of mother and child food and nutrition security.

In adapting the UNICEF-framework (UNICEF, 2015) on mother and child undernutrition, the research investigates the influence of different factors on the household's food and nutrition situation. The basic determinants are infrastructure, market access and socio-cultural factors such as intra-household allocation, gender roles, family structures and local authorities. The underlying determinants define

the household resources for food and nutrition security and can be differentiated in agricultural / horticultural production (including aspects such as post-harvest losses, water for irrigation, cropping patterns), farm- and off-farm income, resources for care and resources for the WASH and Health environment. As immediate and direct factors, the framework describes the health status and dietary intake, which are interrelated. The health status is influenced by the prevalence of diseases. Regarding dietary intake, this study focuses on influencing factors (i.e. meal frequencies, food taboos, wild foods).

In addressing the causes of stunting, various stakeholders have applied the social behaviour change communication approach (SBCC) (Lamstein et al., 2014). Building on existing behaviour change methods, this study investigates the influence of communication channels and key influencers such as individuals in the communities and identifies enabling factors for sustainable change.

Subsequently, this study summarizes recommendations based on the findings and discussions with the local population and local decision makers to improve existing interventions and to offer new entry points to accelerate the reduction of stunting and to increase the well-being of mothers.

Methodology

The team employed both quantitative and qualitative methods. To set the empirical research objectives, the team run a quantitative regression analysis of the two baseline studies conducted by the GIZ and its partners in both project areas in 2015 and 2016. In Eastern Province, the data was collected in September and October 2015 (n: 400), 4 months after harvest and at the beginning of the hungry season. In Maritime Region Togo, the data was collected in March 2016 (n: 440), 5 months after the principal harvest and during the peak of the hungry season.

During field research, the research team members stayed with local communities in both regions for several days. This offered an important opportunity to gain insight into local daily routines and dietary behaviour. Furthermore, team members accompanied local authorities on transect walks (n=24) to gain insight on the topic and conducted focus group discussions (n=100) with different groups of people (e.g. women, beneficiaries, grandmothers). During FGDs, team members employed different tools (e.g. household gender dynamics, seasonal calendars, resource cards) to explore the factors driving the dietary habits of the target groups.

In addition, the team conducted semi-structured key informant interviews (n=44) with local experts such as nurses, teachers or priests. Before, during and after field research, the team conducted guideline-based expert interviews (n=20) with

agricultural experts, political office holders and project officers from other developmental organisations to gather background information and to develop recommendations. The results of the data collection were discussed in validation workshops with scientific experts. During field research, the team was supported by an inter-disciplinary network of researchers and scientists from both countries.

Main findings

Regression analysis for both project regions

The **regression analysis** shows that income generating activities of women, nutrition counselling, and a supportive environment through public health structures are the most effective methods in improving dietary diversity of small farm households in both project regions. Interestingly, caretaking support by siblings is largely positively associated with dietary diversity in Maritime, while rather negatively associated in Eastern Province. This shows that while secondary caretakers appear to play a relevant role in household dietary diversity, their effect is dependent on local context.

Main findings Eastern Province

Almost all households in both districts sell parts of their harvests but encounter problems to generate sufficient income. First, farmers face difficulties in reaching markets due to (1) lack of transport means and deficient public transport services, (2) geographic isolation and (3) insufficient road infrastructure.

Second, annual production cycles overshadow market prices and have a great impact on the reduction of the income margin. Farmers are forced to sell their produce right after harvest when prices are low in order to pay back credits and to rebuy staples as they run out of food when prices are high, i.e. they do not have any option to sell and buy products at favourable times. This anti-cyclical market behaviour additionally leads to increasing income poverty.

While income-generating activities of women are a potential key driver for poverty reduction, women rarely manage to successfully run a business since there is only marginal purchasing power in the scarcely populated rural areas. In addition, income activities are limited by (1) low financial resources and the lack of capital / loans, (2) lack of entrepreneur and business training, and (3) the high work-burden of women.

The empirical research identified the discrimination against women as a major obstacle to achieve food and nutrition security. Women lack decision-making and bargaining power over important food and nutrition related resources and have

high family time burdens. Early motherhood is prevalent in both project areas and constitutes an additional factor impacting child and infant undernutrition.

Agricultural production on the household level is low. This is mainly due to poor soil quality, difficult access to agricultural inputs, post-harvest losses and lack of preservation. Furthermore, external shocks such as the effects of climate change jeopardize annual production.

Horticultural cultivation can play an important role in the availability of micro-nutrients but might not be feasible for all households. This research identifies various barriers for farmers to engage in horticultural cultivation: (1) Poor access to water, (2) lack of suitable land next to water sources, (3) poor access to inputs, (4) limitations in time, and (5) gender-related barriers.

The FANSER programme implements a set of nutrition- and gender sensitive interventions to increase vegetable production in the project region with a varying degree of success such as the promotion of treadle pumps, keyhole gardens and seedling packages.

Household animal husbandry is mainly limited to chickens providing eggs. Not all communities vaccinate their livestock and an outbreak of Newcastle disease led to a widespread reduction in stocks.

The quantity, quality and frequency of meals is reduced drastically during the hungry season. Households developed various strategies to cope with this periodic shortage of food. They look for additional income sources, seek to migrate or rely on food aid programmes. While these strategies may ameliorate the situation in the short run, they often create a vicious circle of poverty and severe and acute malnutrition.

Most households in Eastern Province still consume a relatively unbalanced diet that lacks both animal and plant protein, vitamins and micro-nutrients. Following households, experts and local authorities, this is mainly due to income poverty.

Non-cultivated, wild growing plants in fallow lands and small wild animals such as mice (bush) form an essential part of the diet in East Zambia and help curb food and nutrition shortages. They are especially popular among children, who mainly collect them.

Most women are aware of the importance of a balanced diet during pregnancy and for their children's development. The FANSER cooking demonstrations are a popular instrument to raise awareness on the topic. Additionally, grandmothers, neighbours and local churches play an important role in knowledge transfer. Many

interviewees noted that increased dietary diversity improved their children's health status. However, the lack of income makes it difficult to change dietary behaviour.

The household and communal WASH & health situation differs strongly across localities. While basic medication and treatment in health facilities are mostly free, many women have difficulties to reach the centres. As a result, women do not always attend the recommended number of pre- and postnatal care visits. Monitoring of child growth is not always accurate and needs to be improved to detect early signs of malnutrition.

During field research, the research team realised that influential individuals can drive behavioural change. The interventions benefit from the involvement of local "influencers". In Eastern Province, traditional authorities as well as program volunteers of CRS (Catholic Relief Service) and Care International are regarded with high respect. However, they often struggle to make ends meet. Media use is low and thus only a marginal source of information. Further, its use is limited by a lack of financial capital – women especially lack means.

Main findings Maritime

In contrast to Eastern Province, Maritime is densely populated. Women have problems to successfully run or open a business. Limited financial resources and the lack of electricity hamper several entrepreneurial activities. Many businesses suffer from low regional purchasing power. The availability of financial resources peaks during the harvest season when crops are sold. However, during this period, shortage of time limits the successful management of off-farm business activities.

As in Eastern Province, women are disadvantaged on many levels. Men usually control the households' financial resources, wielding strong influence on spending and limiting women's nutrition relevant practices. The knowledge on the importance and benefits of a diverse diet during pregnancy is fragmented. Experts and individuals attribute the high prevalence of early motherhood to polygamy, lack of empowerment of young girls and a general lack of perspective. The prevalence of early pregnancy highlights the urgent need to extend the target group to younger girls in both Eastern Province and Maritime.

Local diets are monotonous, and the meal frequency is irregular. The consumption of animal protein is especially low among women and children. However, the promotion of chicken rearing through ProSecAl has led to an increase in egg consumption and provides additional income. Wild foods form an integral part of the daily diet, especially during the hungry season. However, their availability is declining.

Agricultural production lacks diversity and depends on staple crops. In relation to Eastern Province and in absolute terms, land plots are very small (between 0.5 and 1 hectare) and the cost of land is comparatively high, affecting -household's capacity to produce food. The difficulty of accessing land has forced a number of families to relocate. Often, households decide to rent land to sustain food security. Problematically, rented land is sometimes sold before harvest, forcing farmers to vacate the land. Additionally, erratic rain patterns, erosion and droughts limit agricultural productivity.

During the hungry season, maternal diseases such as malaria and diarrhoea pose additional risks. Common coping strategies (i.e. reducing quantity and quality of meals, periodic migration) often create a vicious circle of increased poverty and food and nutrition insecurity. In order to generate income, many households sell livestock and pre-sell crops prior to harvest. However, this results in low(est) income possible as the buyers fix prices.

Horticultural production is significantly higher in beneficiary villages and communities, which can be attributed to ProSecAl interventions. Vegetables are mostly grown in small subsistence gardens and commercial production does not play a role. Only few families with access to land parcels close to rivers have the possibility to produce vegetables all year-round. Animal husbandry lacks diversity, and predominantly serves the purpose of economic security rather than increasing the household's dietary diversity.

In Maritime, WASH & Health related determinants threaten food and nutrition security. While the awareness on the importance of clean drinking water is high, many households use water from defective and contaminated groundwater sources as access to clean water is severely restricted. Barriers to access clean water are: (1) High costs of clean water (2) poor infrastructure and long walking distances, (3) poor maintenance of water sources.

The critical situation of household and communal hygiene manifests in a high prevalence of diseases. Sanitation facilities are in poor condition and handwashing is often not possible. Furthermore, many households have difficulties to access health facilities. Childcare is not affordable for most people and the monitoring of children's growth is often inadequate.

ProSecAl is based on existing extension structures and puts a strong focus on community education to improve the nutritional status of households. The programme's cooking demonstrations are a popular tool to channel information on nutrition, health and hygiene.

ProSecAl volunteers and affiliated staff receive high recognition by the communities. Teachers often wield higher influence than local authorities.

Comparison of both project regions

Even though the different regions in Zambia and Togo differ in population density and climatic conditions, the determinants of undernutrition are similar if not the same. The research indicates that income generation, education of women and caregivers and nutrition counselling are key drivers in the reduction of nutrition insecurity, and respective interventions can be applied in other countries.

In both regions, households' agricultural production is insufficient to guarantee food and nutrition security throughout the year. This manifests in the yearly re-occurrence of the so-called hungry season which can last from several weeks to several months.

In Eastern Province, extending and diversifying production has the potential to improve food and nutrition security. Mechanisation could help increase both labour efficiency and agricultural production while reducing women's work burden.

In Maritime, demographic growth increases the pressure on scarce agricultural land. This requires immediate action, i.e. the diversification of the cropping pattern, the increase of yields and the reduction of post-harvest losses.

Smallholders in both regions are facing other adverse factors they can hardly control for (i.e. degradation of land, climate change, rising or unpredictable prices, time poverty), which jeopardise both agricultural production and income and, ultimately, food and nutrition security.

In addition, sanitation -related determinants remain a vital cross-sectoral issue in both regions. Limited access to and availability of water not only jeopardize agricultural production but also pose risks to the target group's health status. Health facilities are often not accessible. In Maritime, many households cannot afford medical treatments. Furthermore, many health facilities are poorly equipped and lack materials to identify stunting.

Gender roles combined with social structures also affect the daily diets of the target group. Despite their special need for micronutrients, women (especially during pregnancy and lactation) and their children do not receive sufficient dietary diversity. As most women are financially dependent on their spouse, their ability to access micronutrient-rich food is restricted. At home, women possess poor bargaining power over important nutrition related resources. Due to their immense workload, women have little time for income generation and care.

In both project regions, early motherhood is prevalent and poses additional nutritional risks to the mother and the unborn. Despite various constraints, stakeholders should address this issue and empower young girls.

Infants and children are mostly affected by undernutrition and deserve special attention during, but also beyond, the 1000-day window of opportunities. Older siblings and other care takers wield a strong influence on child nutrition, and their knowledge and dedication are essential.

Addressing undernutrition requires a multisectoral approach. The comprehensive Social and Behavioural Change Communication (SBCC) approach is increasingly gaining attention as a tool to improve the supply of information to poor and rural households. The use of adequate communication channels is essential. Both FANSER and ProSecAI volunteers play a vital role in the imparting of nutrition and agricultural knowledge. While the change of dietary habits and behaviour usually takes time, the motivation and dedication of key individuals are important drivers of behavioural change.

Recommendations

Immediate action is needed to break the vicious circle of hungry season, malnutrition and stunting. Implementing agencies need to provide immediate relief and contribute to long-term sustainable change by addressing the issue on multiple levels.

Interaction with the target group

Both FANSER and ProSecAI programme can accelerate the achievement of their desired outcomes by applying the following measures:

- Creating incentives for the programme's volunteers and key influencers
- Identifying the most affected households through vulnerability analysis in the villages
- Extending the current target group by involving children and other care givers
- Spreading the core message via multiple communication channels adapted to the needs of the target group and specifics of the locality
- Designing communication materials in a clear, appealing, referential, adapted and accessible way
- Involving the community through interactive community meetings, community conversations, and local management committees

- Investing in advocacy on food and nutrition security by identifying and involving key influencers (see FANSER and its District Nutrition Coordinating Commission)
- Investing in communal infrastructure (i.e. water sources)

Increasing resources for a diverse diet

To promote a diverse dietary intake, interventions need to improve the financial and economic resources of small farm households. Agricultural production and income-generation can be increased through (1) farmer field and business schools, (2) promotion of bio fortified crops, (3) soil management trainings, (4) semi-cultivation of wild foods.

Horticultural production can be increased by (1) establishing community seed banks and storage mechanisms, (2) promoting school gardens, (3) promoting micro-nutrient rich vegetables and fruits, (5) promoting adequate preservation methods, (6) providing alternative cultivation systems such as bag or container gardens, and (7) improving access to inputs.

To increase consumption of (animal) protein sources it is recommended to: (1) diversify animal husbandry (i.e. pigeons, rabbits, guinea fowls), (2) evaluate small-scale aquaculture, and (3) evaluate alternative plant protein sources (for example, nitrogen- rich plants such as legumes).

Furthermore, farmers' resilience during the hungry season can be strengthened by the establishment of (1) processing and storage techniques and facilities as well as automatization within this sub-sector (i.e. sealed bags) and (2) (e-voucher-) community storage systems.

Sanitation, WASH & Health

Malnutrition of children and infants is often associated with diarrhoeal and parasitic diseases, which result from the lack of clean water supply, inadequate sanitation and poor hygiene.

This study proposes various measures to improve the access of households and communities to clean drinking water (i.e. rainwater harvesting, collective and communal filter systems, and the creation of maintenance funds through donations and water committees).

Childcare

In order to increase childcare on multiple levels, the following measures are proposed:

- Raising health workers' awareness on stunting to improve child growth monitoring
- Additional focus on decision makers (mainly men) regarding important and relevant resources (i.e. financial, transport)
- Distributing growth charts and relevant materials to the target group, volunteers and communities
- Involving communal authorities and generating synergies with other organisations to increase the number of care visits at local health centres
- Implementing measures to improve household and community hygiene (availability of communal water sources, maintenance of hand washing stations, awareness raising of children)
- Improving hygiene and sanitation (construction of latrines, awareness raising among children)

Early motherhood

Early motherhood affects child growth and health in various ways. It is prevalent in both regions, which requires paying special attention to young women and girls. Recommendations to empower girls include (1) reaching young girls that are particularly vulnerable, (2) the identification and training of female role models on the topic, and (3) the involvement of young men and boys to raise awareness on the consequences of early pregnancies.

Conclusion

The UN's Sustainable Development Goal 2 (SDG 2) to end all forms of hunger and malnutrition by 2030 requires joint efforts on a multi-sectoral level. This research highlights the interrelation of these determinants.

GIZ has applied a set of interventions to tackle food and nutrition insecurity. In both project regions, the study team observed a better nutrition status of beneficiary households versus non-beneficiary households of the target group. This observation indicates that the interventions are effective. However, the research also shows that despite these interventions, beneficiary households cannot sustain a balanced diet throughout the year. In order to break the cycle of poverty, hungry season and malnutrition among women and children, more and joint coherent efforts are needed across all sectors and levels.

There is no sole and unique silver bullet in the fight against child stunting. To achieve SDG 2, all stakeholders need to prioritise gender-, nutrition- and income-sensitive agriculture, and implement climate change mitigation strategies. On the

communal and regional level, income growth, political will and good governance are essential factors helping put an end to under- and malnutrition.

1 Introduction

Food and nutrition insecurity are topics of great global concern. The UN's Sustainable Development Goal 2 (SDG 2) calls for the end of all forms of hunger and malnutrition by 2030 (UN, 2018). In 2017, roughly 815 million people suffered from hunger[1] and more than 2 billion people were affected by micronutrient deficiency, so-called hidden hunger (Welthungerhilfe, 2018). Each year, three million children die from malnutrition-related causes. That is nearly half of all child deaths under the age of five (WHO, 2015). This study focuses on the determinants of micronutrient deficiency among **women and children** in Togo and Zambia on household level.

Most people affected by hidden hunger do not show direct and immediate physical symptoms and are often unaware of their condition. The absence of micronutrients can result from unbalanced diets lacking diversity or from diseases reducing the uptake of important nutrients (WFP, 2007). Children affected by micronutrient deficiencies frequently suffer from a condition of impaired growth known as **stunting**. Children who experience stunting early in life are at a higher risk of more frequent and severe infection and take longer to recover from illness (Deway and Begum, 2011).

Zambia faces one of the world's highest rates of **child stunting**, with more than 40 % nationwide and 43 % in Eastern Province. Togo reports stunting rates of more than 27 % nationwide and 29 % in Maritime Region (WHO, 2018). The target group is chronically undernourished and suffers from poverty and insufficient food diversity. In addition, knowledge on a healthy diet is inadequate. In both regions, limited access to health services, drinking water and sanitation aggravates existing problems (Dadi and Trentmann, 2016; Evang and Kuchenbecker, 2015).

Crop production and food and nutrition security share a complex inter-dependency. Several studies show a positive relationship between production diversity and dietary diversity amongst rural smallholder households (Ecker, 2018; Kissoly et al., 2018; Kumar et al., 2015; Jones et al., 2014). Likewise, the production of high- profit crops can increase income and improve smallholders' food access.

[1] "Hunger" refers to undernourishment over a definable or long-term period when the body absorbs less food than it needs. Hunger frequently arises in connection with specific crises such as droughts, wars and disasters (Welthungerhilfe, 2018).

2 Introduction

The economy of **rural areas in both project regions** is underdeveloped, majorly agro-based, not diversified and yet has to achieve food and nutrition security. The unfortunate reality for many households that rely on agriculture for nutrition and their livelihood is that the average **yields are low to very low.** Maize is the staple crop and its yields are about 1.2 and 2.4 tonnes per hectare in Togo and Zambia, respectively (FAO, 2018). This is well below the global average of about 5.8 tonnes per hectare (OECD, 2018) and among others due to soil degradation caused by unsustainable farming methods and lack of adequate fertilizers and manure.[2]

For small farmers on the local level, low yields of staple crops have two effects: low quantity of food for self-consumption and low income from selling the so- called sur-plus, which implies fewer or almost no resources to buy additional and diverse food items at the markets to complement and diversify the diets.

Food and nutrition insecurity commonly follow the agricultural seasonal cycle. This phenomenon is referred to as the **hungry season**: food stocks deplete and financial resources diminish prior to the following harvest. The annual reoccurrence of the hungry season illustrates that rural households, besides diversity, still lack sufficient quantity of agricultural production to meet their needs. Popular coping strategies, i.e. the collection of wild foods in bush and fallow areas, have become difficult as such areas are shrinking.

For many smallholders, animal husbandry and livestock production remain an important non-liquid asset. In times of crisis, it serves households as a security (Oluwatayo and Oluwatayo, 2012). In the project regions livestock is such an asset in crisis and people rarely include it as part of their diet.

Deficits are further compounded by **structural problems** such as inefficient agricultural policies, sub-optimal extension systems, weak state of infrastructure, geographical isolation (in Zambia) and underdeveloped markets, hence market failure. Altogether, these factors result in low incentives and ability to produce, a reduced capacity for value addition, and low value chain activity for primary production. In both countries, **national agricultural and nutrition policies** (such as the subsidy programs for the staple crop maize) do not show the desired but rather adverse effects. National nutritional policies are further described in chapter 2.3., however, an in-depth analysis is beyond the scope of this study.

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[2] The widespread practice of "soil mining" (growing crops without replacing the nutrients in the soil) is due to a number of factors, including ineffective agricultural policies on the national level, an ineffective and one-sided maize subsidy programme emanating from structural adjustment programmes and the promotion of maize during colonial times, and a corrupt system of cooperatives.

To tackle this problem the German Federal Ministry of Economic Cooperation and Development (BMZ) launched the **One World – No Hunger initiative (SEWOH)** in 2014 to contribute to the UN's sustainable development goals. The objective of this initiative is to ensure that all people have access to safe, nutritious and sufficient food throughout the year and to strengthen resilience in crisis (see chapter 2.1). It focuses on improving rural development and food and nutrition security through development cooperation projects in vulnerable regions. As part of this initiative, the BMZ commissioned the GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) to implement the programme "SEWOH - Food and nutrition security and enhanced resilience" with food and nutrition security interventions in eleven countries (see section 2.2.).

Problem statement

SLE (Centre for Rural Development) and GIZ developed a problem statement to address the food and nutritional challenges in the project regions in Togo and Zambia. The lack of micronutrients for women of reproductive age and children during the first 1,000 days of life creates severe consequences and is the focus of this study.

This research aims to get a better understanding of the influencing factors with a focus on behavioural determinants of malnutrition within rural farming communities. Correspondingly, this study focuses on a set of research questions. In order to answer those questions, the research starts with the **analysis of a given quantitative data** set, followed by **qualitative field research,** and concludes with the development of **recommendations**.

The **quantitative section** analyses the baseline data set and takes a closer look at the factors that influence food and nutrition security. The identification of the variables and the discussion of their significance helps to answer the following research questions:

- How can the typical rural (farm-) household be described in which hunger and malnutrition are a common and regularly repeating feature?

In the **qualitative section,** the research investigates the determinants of food and nutrition security (for each project region).

The first section examines the basic determinants. Accordingly, the conceptual framework is based on the UNICEF-framework on maternal and child undernutrition (UNICEF, 2015):

- Which role do infrastructure and market access, socio-cultural factors as intra-household allocation, gender roles, family structures and local authorities play in maternal and child under- and malnutrition?

Subsequently, the research addresses the underlying determinants. Within the agricultural section, the **resources for food and nutrition security** of rural households are elaborated.

- Which are the determinants that affect the household's food and nutrition security?

In line with the analysis of the determinants, the research looks at the influence of agricultural (and horticultural) cultivation and farm- and off-farm income on food and nutrition security. In addition, it includes other factors such as irrigation, land access and access to inputs.

Resources for care and the WASH & Health environment are covered with the following set of questions:

- Which are the determinants that affect care, feeding and dietary practices among rural households?
- This question focuses on the underlying and immediate determinants of food and nutrition security, such as nutrition and feeding practices, the role of care givers and nutrition knowledge.
- Which are the determinants that affect the households and communal WASH & Health environment?

In this context, associated factors such as the household's access to clean drinking water, health facilities and services as well as adequate sanitation are investigated.

Quantitative data on the **dietary intake** of households in both regions was already gathered in the baseline studies (2.2.). With the following research question the study focuses on circumstances that affect dietary diversity:

- What are the determinants that affect the dietary intake of the target group?
  - In this context, the following parameters of households' dietary intake are considered: Meal frequency, food preparation, food taboos, coping strategies during the hungry season, consumption of wild foods, children's diet and maternal diet during breastfeeding.

Building on existing behaviour change methods, the study investigates the **influence of communication, information dissemination** and the programme interventions themselves in addressing the following questions:

- What are important communication channels to address a healthy food and nutrition behaviour in the project regions?
- Who are important influencers within the communities?
- What are barriers and enabling factors for a positive behaviour/practice?

Considering specific regional, socio- economical and climatic aspects, the findings of the quantitative and qualitative research sections are presented in two subsequent chapters focussing on Eastern Province and Maritime, respectively (chapter 5 and chapter 6). Chapter 7 contrasts and summarizes the results of the quantitative and qualitative research in both project regions and sets the foundation for the development of the recommendations. The **recommendation section** (chapter 8) proposes interventions for Maritime and Eastern Province[3] to respond to the following research question:

- How can the programs improve the nutrition situation of the target group?

[3] In case interventions refer to specific circumstances of one project region, it is indicated accordingly.

2 Background

2.1 Food and nutrition security – general considerations and current situation in the project areas

The current state of **food and nutrition (in-)security** in developing countries illustrates the inequalities and challenges facing the world today (UN, 2017). **Food security** describes "a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO et al., 2017). The FAO (2008) set out four dimensions for guaranteeing food security (Table 1).

Table 1: Food security dimensions

Physical availability	Food availability addresses the "supply side" and is determined by the level of food production, stock levels and net trade.
Economical and physical access	An adequate supply of food at the national or international level does not in itself guarantee household level food security. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditure, markets and prices in achieving food security objectives.
Utilization of food	Utilisation is commonly understood as the way the body harnesses nutrients. Sufficient energy and nutrient intake by individuals are the result of good care and feeding practices, food preparation, dietary diversity and intra-household distribution of food. Combined with proper handling of consumed food, this determines the *nutritional status* of individuals.
Stability of the other dimensions	Even if one's food intake is adequate today, one is still considered to be food insecure if one has inadequate access to food on a periodic basis, risking a deterioration of nutritional status. Besides periodic shortages (hungry season), adverse weather conditions, political instability and economic factors (unemployment, rising food prices) may have an impact on food security status.

Source: FAO, 2008.

The term **food and nutrition security (FNS)** includes the "secure access to an appropriately nutritious diet coupled with a sanitary environment, adequate health services and care [...] to ensure a healthy and active life" (FAO et al., 2017).

Food and nutrition insecurity follow cyclical patterns of insufficient access and availability to food (FAO, 2008) and manifests in the (recurrence) of the so-called "hungry-season".

The **hungry season**[4] describes the phenomenon when food stocks deplete and income opportunities decline prior to the harvest season. Rural households in both project regions strongly rely on their agricultural production for food and nutrition security and income generation. Usually, labour demand is low when labour force is available. As almost all farms are managed in a similar way, casual work opportunities on other farms are difficult to find.

Since the farming systems are mostly rain-fed, farmers depend on the annual precipitation pattern. Therefore, climate change and erratic rainfalls increasingly threaten smallholders' existence.

Smallholders face several challenges in achieving sustainable production quantities throughout the year:

- **Soil mining / nutrient depletion** is considered the biophysical root cause of low or declining yields. Studies confirm a relationship between cropping patterns, erosion and low fertilisation and soil mining (Drechsel et al., 2001).
- **Limited labour force**. Agricultural and especially horticultural production are labour intensive and many households cannot allocate enough time to field work, particularly during the hungry season. Furthermore, mechanization is rare and only few households use draught animals (such as oxen) for ploughing.
- **Population growth** is high. Though a high population density can trigger an increase in productivity, many households lack access to fertile and arable land. Densely populated, Togo's Maritime region is particularly prone to land scarcity: households can only work on less than 1 ha and have very limited possibilities to extent their fields.
- **Contracyclical market behaviour**: Products are often sold off immediately after harvest at low prices because households are in desperate need of cash (i.e. to pay the school fees and to pay off credits). Prices then skyrocket when food stocks run out, and individuals who formerly sold produce have to buy it back at much higher prices (Neubert et al., 2011).

[4] In Eastern Province, the hungry season typically occurs from October to March. In Maritime, it occurs from January to April.

- **Post-harvest losses**: Poor storage of surplus can lead to post-harvest losses of up to 40 % (Interview WFP). However, many households do not produce enough to store sufficient quantities for the whole year.

This vicious circle leads to coping or (mal-) adaptation strategies (i.e. meal skipping, selling of livestock, migration) which - in the longer run - increase food and nutrition insecurity among rural households. This period is characterised by a negative energy balance, especially among pregnant women, and associated with a lower average birth weight. Furthermore, malaria and diarrheal diseases peak during hungry season and pose additional risks to mothers, foetuses and infants (Moore et al., 1999).

Micro-nutrient deficiency

Hunger[5] and limited income determine not only the insufficient quantity of food intake but also the lack of dietary diversity. Combined, they result in malnutrition. **The causes of malnutrition** are deficiencies, excesses and imbalances of micronutrient intake (FAO, 2008). Malnutrition has different forms and leads to stunting, wasting and overweight (Table 2: Forms of malnutrition).

Stunting replaced underweight in the monitoring of the achievements in the fight against child undernutrition (UNICEF, 2013). Children who are stunted early in life are at higher risk of catching common infections and are more vulnerable to morbidity. The symptoms can be severe, and recovery delayed. In the long term, stunting causes poor physical growth and diminished cognitive abilities. Stunting can lead to decreased productivity and minimizes economic earnings over a lifetime (WHO, 2017). The decline in stunting in Sub-Sahara Africa was the lowest in the world between 1970 and 2010, and only amounted to 13.2 % (Smith and Haddad, 2015).

[5] Hunger is defined as food deprivation. Commonly it is understood as insufficient food energy consumption. While in recent decades the global starving population has decreased, the number of people suffering from hunger in sub-Sahara Africa today is higher than ever (Evang and Kuchenbecker, 2015).

Table 2: Forms of malnutrition	
Malnutrition in its different forms	
Stunting	Stunting is the impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation. Children are defined as stunted if their height is more than two standard deviations below the WHO Child Growth Standards median for their age (Smith and Haddad 2015). The global share of children suffering from stunting declined from 39.6 % (1990) to 23.8 % (2014) (WHO, 2015).
Wasting	Wasting refers to a child who is too thin for his/her height. Wasting is the result of acute malnutrition where a child does not get enough calories from food and faces an immediate risk of death. In 2014, about 7 % of children are considered "wasted" (WHO, 2015)
Overweight	Overweight and obesity are defined as the "abnormal or excessive fat accumulation that presents a risk to health" (WHO, 2015). The global overweight prevalence increased between 1990 and 2014, from 4.8 to 6.1 %.
Source: WHO, 2015; Smith and Haddad, 2015.	

Table 3 shows figures on food and nutrition security in the two project countries. Zambia has one of the highest levels of dietary inequality worldwide. Both countries have a lower protein and fat supply than other countries in Sub-Sahara Africa where the average daily protein and fat intake is 69.1 g/day/person and 54.46 g/day/person, respectively. In terms of micro-nutrient deficiencies, the target group in Zambia and Togo has a high prevalence in Vitamin A- and Zinc-deficiency. Annex 12.1 "Anaemia is critically high in both countries" (p. 179) gives an overview on related micro-nutrient deficiencies.

Table 3: Indicators of food and nutrition security in Zambia and Togo		
Facts on dietary intake in Zambia and Togo	**Zambia**	**Togo**
Coefficient of variation (CV) caloric intake[6] (Roser and Ritchie, 2014)	0.43	0.29
Daily per capita protein supply (Roser and Ritchie, 2014; g/day/person) [7]	55.2	59.79
Daily per capita fat supply (Roser and Ritchie, 2014; in g/day/person)	42.05	47.59
Vitamin-A deficient pregnant women (in %; WHO, 2009)[8]	14.0	19.9
Vitamin-A deficient children (in %; WHO, 2009) [9]	54.1	35.0
Zinc deficiency (in %; Wessels and Brown, 2012) [10]	44.9	25.8
Vitamin A supplementation coverage rate in children (in %; WB, 2014)[11]	6	93
Anaemia in women aged 15–49 (in %; WB, 2014)	33.7	48.9
Source: Roser and Ritchie, 2014; WHO, 2009; Wessels and Brown, 2012; WB 2014.		

2.2 The SEWOH-programme

The SEWOH programme (Box 1) aims at improving nutrition security and resilience to food crises. The specific measures of the programme are individually composed for each country and bundled in so-called country packages[12]. The activities are

[6] The CV measures the inequality of caloric intake across a given population per capita. It represents the data spread around the mean caloric intake; higher values represent larger levels of dietary inequality.

[7] Average daily per capita protein/fat supply is measured in grams of total intake per day. This indicates the availability in each household but does not necessarily indicate the quantity consumed (food may be wasted at the consumer level).

[8] Prevalence of night blindness (symptom of moderate-to-severe vitamin A deficiency) in pregnant women, measured by the percentage of pregnant women with night blindness during the period 1995–2005.

[9] Prevalence of vitamin-A deficiency in pre-school children under 5, measured by the percentage of children with serum retinol levels <0.7µmol/l (a key indicator of vitamin A deficiency)

[10] The prevalence of zinc deficiency, measured by the share of the total population whose intake is below the necessary physiological level, 1990–2005.

[11] Vitamin A supplementation refers to the percentage of children aged 6–59 months who received at least two doses (capsules) of vitamin A in the previous year.

[12] The interventions of the implementing agencies are diverse and not congruent within the country packages and the project regions. However, this research contrasts the interventions to the findings. This research is neither an evaluation of the interventions nor a contrasting juxtaposition of the qualitative and quantitative results of the baseline studies.

tailored to local interests and needs and involve individuals in a range of topics: agriculture, health, education, social protection and WASH (GIZ, 2018).

Box 1: Facts on the SEWOH programme.

Some brief facts about the SEWOH programme

Title: Food and nutrition security, enhanced resilience (2014–2022; EUR 125 million)

Commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ).

SEWOH operates in 11 countries: Benin, Burkina Faso, Cambodia, Ethiopia, India, Kenya, Malawi, Mali, Togo, Yemen and Zambia.

Target group: Women of childbearing age, pregnant women, nursing mothers and small children

Fields: The programme has a multi-sectoral approach and works in various fields (i.e. agriculture, hygiene/water, nutritional counselling, health services and education).

Source: BMZ, 2018.

Country programmes collaborate with national governments and international non-governmental organisations (NGOs). Further, the country packages are part of the international **Scaling Up Nutrition (SUN)** [13] initiative to end malnutrition in all its forms (Box 2).

[13] The SUN initiative is committed to the principle that good nutrition is the best investment in the future (UN, 2018).

Box 2: The SUN movement

The SUN movement

Sun aims to strengthen political commitment and responsibility to end malnutrition. The movement is run by SUN stakeholders and hosted by the United Nations Office for Project Services. SUN sensitises civil society representatives, parliamentarians, donors, businesses and researchers to the importance of nutrition. Its main objectives are: (1) to support an enabling political environment; (2) to prioritise and institutionalise actions that contribute to good nutrition; (3) to implement actions aligned with common results frameworks; and (4) to financially support mobilisation.

Source: SUN, 2015.

The Target group of the SEWOH-programme

Nutritional deficiency of infants and children can lead to lasting damage, particularly if it occurs during their first 1,000 days[14]. Being particularly vulnerable to nutrient deficiencies, women and children are the main target group of the SEWOH-programme.

Table 4 (left) shows the nationwide malnutrition data for children and mothers in Togo and Zambia. In both project countries, stunting is more prevalent than other indicators of malnutrition among children under five, and higher in rural than in urban areas. Tab. 4 on the right describes the health indicators of mothers[15] in Togo and Zambia. The figures show that early pregnancies and infant mortality are critically high in both countries, and high numbers of anaemia in both women and children underscore the lack of sufficient iron intake.

[14] The "first 1,000 days" refers to the period from conception to an infant's second birthday (USAID, 2017).

[15] Teenage mothers in % of women aged 15–19 who have children or are currently pregnant.

Table 4: Indicators on malnutrition of children (left) and mother and child health (right) in Zambia and Togo

Malnutrition of children under 5 (in %)	Zambia (2013)	Togo (2014)	Indicator on mother and child health	Zambia	Togo
Wasting	6.3	6.7	Teenage mothers (%)	28.5	17
Severe wasting	2.50	1.5	Pregnant women who receive prenatal care (%)	95.7	73
Overweight	6.20	2.0	Infant mortality rate (per 1,000 live births)	43.8	51
Prevalence of anaemia	54.20	71.0	Fertility rate, total (births per woman)	4.98	4.45
Stunting male	42.30	28.10	Anaemia in women aged 15–49 (%)	33.7	48.9
Stunting female	37.70	26.90	Anemia in pregnant women (%)	39.1	61.4
Stunting	40.00	27.50			
Urban	35.6	16.2			
Rural	42.1	33.3			

Source: WHO, 2018.

The SEWOH-programme in Zambia and Togo

In **Zambia**, the programme **FANSER** (Food and Nutrition Security, Enhanced Resilience) is coordinated by the GIZ office in Lusaka and implemented by their regional office in Chipata in the districts of Katete and Petauke in Eastern Province. The National Nutrition Commission (NCC) leads the programme's political agenda. CRS and CARE International (until August 2018) are the implementation partners. The target group consists of 17,250 women at reproductive age (15–49 years) and 13,500 young children aged between 6 and 23 months (Evang and Kuchenbecker, 2015).

In **Togo**, the GIZ **ProSecAl** (Programme Securité Alimentaire et renforcement de la resilience) is implemented by GFA Consulting Group with offices in Lomé, Tsevié and Kara. The Ministry of Health and the Ministry of Agricultural are political

partners[16]. Other partners include the agricultural extension service ICAT (Institut de conseil d'appui technique), the Direction Régionale de Santé (DRS) Maritime and the NGOs Crema, Mopib, Credi. The area of implementation in Maritime are the prefectures[17] of Bas-Bono, Vo, Yoto and Zio[18] (GFA, 2017). The ProSecAl **target group** in Maritime consists of 11,500 women at reproductive age and 5,800 young children aged 6–23 months (Dadi and Trentmann, 2016).

In both project regions, GIZ works with various partners and implements a set of **multi-sectorial interventions** to improve the food and nutrition security situation. The core interventions include cooking demonstrations, nutrition counselling paired with information on WASH & health, and support to increase and diversify the agricultural and horticultural production. For detailed information on the country packages in both countries see Annex (p. 180-181).

The SEWOH nutrition baseline study in Zambia and Togo

Prior to the implementation of the SEWOH-programme, GIZ carried out baseline surveys to analyse the food and nutrition security situation. In Eastern Province, the baseline data (n: 400) was collected in September and October 2015, 4 months after harvest and at the beginning of the hungry season. In Maritime, the data (n: 440) was collected in March, 5 months after the principal harvest and during the peak of the hungry season.[19]

To assess the nutritional status, the data provided indicators of dietary diversity (Dadi and Trentmann 2016; Evang and Kuchenbecker, 2015). Dietary diversity is a qualitative measure of household access to a variety of foods that contain macro- and micronutrients and ensure a balanced diet for a healthy life (WFP, 2008). Dietary diversity is directly measured by the Individual Dietary Diversity Scale of women and their children (IDDS-W, IDDS-CH) (Table 5). The baseline datasets capture this aspect with the indicators Household Food Insecurity Scale (FIES-H) and the Minimum Meal Frequency for children (MMF). The Minimum Acceptable Diet (MAD) indicator combines quality and quantity of food consumed. The dataset provides information about households' socioeconomic status, agricultural production and health behaviour.

[16] Ministère de la Santé et de l'Hygiène publique, Ministère de l'Agriculture, de l'Elevage et de l'Hydraulique

[17] Since 2018, ProSecAl has also been active in the Kara region of northern Togo.

[18] The prefecture Zio was chosen as the pre-test location; no empirical findings are considered in the results.

[19] A structured questionnaire served to collect quantitative data.

Table 5: Indicators used to measure food and nutrition security	
Applied indicators to measure dietary diversity	
IDDS	The Individual Dietary Diversity Score (IDDS) reflects the nutritional value of a respondent's diet (Kennedy, Ballard, and Dop 2010). This study chose to measure seven food groups in children aged 6–23 months (IDDS-CH) and ten food groups in women (IDDS-W)
MDD	Minimum Dietary Diversity (MDD) is the minimum intake of four food groups by children aged 6–23 months (MDD-CH) and five food groups by women (MDD-W) (Kennedy et al., 2017).
MAD	Minimum Acceptable Diet (MAD) is determined by MDD and Minimum Meal Frequency (MMF) of breastfed and non-breastfed children. The MMF in breastfed children aged 6–8 months is 2 meals a day or 3 meals a day at 9–23 months. MMF in non-breastfed children is 4 meals a day at 6–23 months ("Meals" refer to any food stuffs other than breast milk (WHO, 2008).
FIES-H	Food Insecurity Experience Scale – Household Level (FIES-H). The FIES-H is a statistical scale that measures the severity of food insecurity at a household level. The questionnaire focuses on self-reported food-related behaviours and experiences that are associated with increasing difficulties in accessing food due to resource constraints (FAO, 2015).
Source: Kennedy et al., 2017; WHO, 2008; FAO, 2015.	

Main results of the Nutrition Baseline Surveys

The baseline data (Table 6) shows that the food and nutrition security status of children aged between 9 – 23 months is critical in both Maritime and Eastern Province: the majority of children does not eat a sufficiently diverse diet required for a healthy life. Only 45 % (Eastern Province) and 43.1 % (Maritime) achieve minimum dietary diversity. Children in Eastern Province eat slightly more diverse and consume four food groups on average; the main food groups are "grains, roots and tubers", "other fruit and vegetables", "legumes and nuts", and "vitamin A-rich fruits and vegetables". Children in Maritime show a similar eating pattern but eat less "legumes and nuts" and more "flesh foods".

Table 6: Indicators on food and nutrition security		
Main results from the baseline data in both project regions		
	Eastern Province (2015)	**Maritime (2016)**
Dietary diversity (children) Minimum DD: Average:	 45% 3.5 food groups	 43.1 % 3.1 food groups
MAD	33.8 %	33.3 %
Dietary diversity (women) Minimum DD: Average:	 56.8% 4.7 food groups	 27.7% 3.9 food groups
Food insecurity (HFIES): Moderate: Severe:	 24 % 13.5 %	 72.3 % 4.1 %
Source: Baseline data Eastern Province and Maritime; Dadi and Trentmann, 2016; Evang and Kuchenbecker, 2015.		

Despite small differences with regard to dietary diversity, the result of both the quality and quantity of feedings, the minimum acceptable diet indicator (MAD), is equally low: only one third of children achieve MAD-status, meaning that caretakers are neither able to provide sufficient diversity of food items nor minimal meal frequency to the vast majority of infants in both project regions. In the result section, this study discusses the causes of these alarming figures.

In contrast to the low variance of food and nutrition security among children in both countries, the dietary diversity of women differs considerably between the two project regions. In Eastern Province, women show higher numbers (56.8 %) of minimum dietary diversity than their children (45 %). In Maritime, the reverse holds true: minimum dietary diversity (MDD) is achieved more often by children (43.1 %) than by mothers (27.7 %). This is an interesting result, as the food items through own production are available for the whole household.

The baseline studies reveal that women and children of both project regions lack the same food groups, in particular animal products (meat, dairy, eggs) and vitamin-A rich food items.

Household food insecurity, measured by the HFIES, differs. According to the statistical regression analysis, 76.4 % of households in Maritime suffer from severe or moderate food insecurity, whereas in Eastern province, household food insecurity is considerably less (37.5 %). These differing HFIES results might be explained by the period of the data collection: in Togo, the data was collected in March, when the hungry season had reached its peak, whereas in Zambia the data was collected in September and October when the hungry season was just about to start.

2.3 The project regions

The two project regions in Zambia (the districts of Katete and Petauke in Eastern Province) and Togo (the prefectures of Bas-Mono, Yoto, and Vo in Maritime) differ in political, socio-economic and climatic characteristics.

As outlined before, Zambia suffers from high rates of **child stunting** (more than 40 % nationwide and 43 % in Eastern Province). Stunting rates in Togo are lower (27 % nationwide and 29 % in Maritime Region) but still critically high (WHO, 2018).

The project region in Togo is densely populated (Yoto: 133; Vo: 294; and Bas-Mono: 355 inh./km²) and many villages are semi-urbanized and connected by roads, allowing for the exchange of goods. Despite the semi-urbanized character of the villages, most households are smallholders. Their land plots are small, and often insufficient to achieve food and nutrition security.

In contrast, population density in Zambia's Petauke (34 inh./km²) and Katete (66 inh./km²) is low. Villages are remote and lack basic infrastructure. Distances to markets are long, and transport of goods and people is difficult.

It is often argued that small farm households generally need a minimum of 5 acres to secure food and nutrition. However, size-unrelated factors such as climate and rain patterns, soil consistency, cultivation patterns and agricultural inputs have a high impact on smallholders' productivity, putting this threshold into question (FAO, 2015; Rapsomanikis, 2015).

Agriculture in both regions is rainfed. While Eastern Province has only one rainy season, Maritime has two rainy seasons that allow for two agricultural seasons. Both regions' agriculture is dominated by the cultivation of maize (in Maritime, cassava also plays an important role), and the main animal husbandry is poultry farming.

In Togo, only 40.1 % of the rural population has access to clean drinking water and only 2.7% has access to hygienic sanitation facilities (UNICEF, 2013b). While Zambia made considerable progress in the health sector from the provision of basic health services to the availability of antiretroviral treatments (Mo Ibrahim Foundation, 2019), the rural population still suffers from limited access to health services and sanitation.

Both countries are members of the SUN-movement (Box 2) which addresses food and nutrition security through different multi-sectoral approaches. However, programmes have not yet shown the desired effects, and have difficulties in reaching households in remote areas (see p. 21 for Zambia and p. 25 for Togo).

2.3.1 Eastern Province of Zambia

Eastern Province has a population of 1.833 million inhabitants. 87.8 % live in rural areas, whereas the national average is 58.2 % (Table 7). Population growth is high at 2.6 % (2.2% for rural and 5.9 % for urban Eastern Province). The literacy rate is 54.4 %, and primary school attendance is low: only 44.8 % (Katete) and 49.2 % (Petauke) of the 7 to 13-year-old children are attending primary school (data from 2010; CSO, 2015). Fever and malaria cause 19.2 % of the deaths in Eastern Province (CSO, 2015).

Table 7: Population data of Eastern Province.

Facts about the projects' districts		
	Petauke	**Katete**
Population	241,056	160,985
Surface in km²	7,140	2,433
Population density/km²	33.76	66.16
No. of wards	18	18

Source: Population Census Zambia,2010.

The province consists mostly of farmlands, bushlands and forests (ILUA I REPORT, 2008). Agriculture (commercial and subsistence) is the dominant economic sector (Table 8; CSO 2014). Other traditional economic activities in Eastern Province include hunting, the collection of wild fruits and vegetables, and barter trading (Simute et al., 1998).

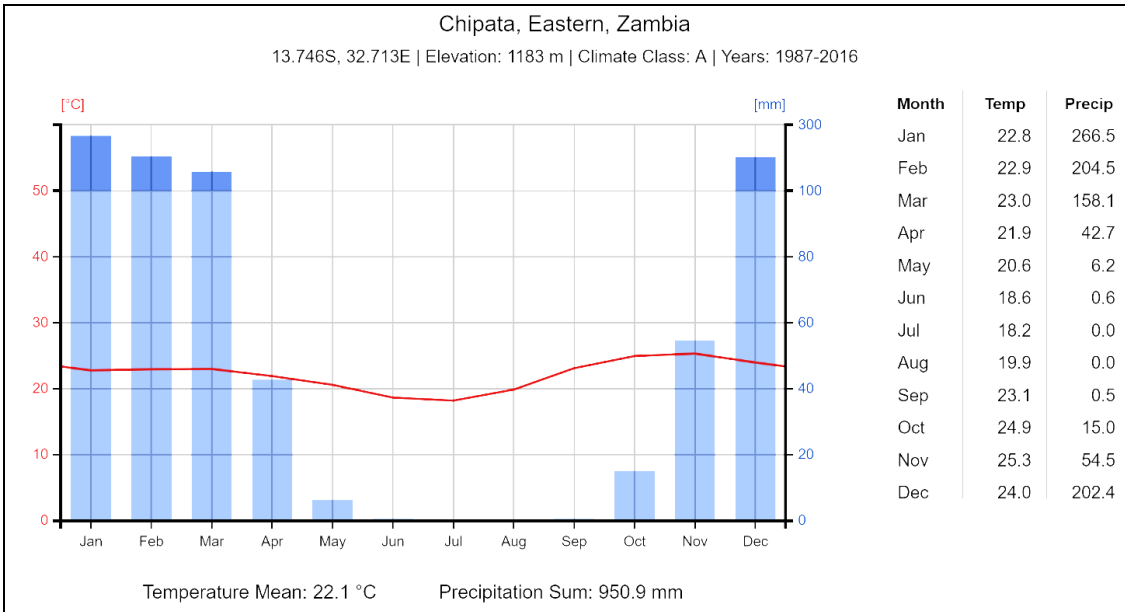
Table 8: Percentage of households producing a certain crop in 2013/14	
Crop production in Eastern Province (compared to nat.)	
Maize	95.3 (83.4) %
Cassava	1.7 (22.1) %
Millet	0.3 (4.6) %
Sorghum	0.3 (1.4) %
Rice	1.1 (3.5) %
Mixed beans	4.7 (11.2) %
Soy	11.5 (4.5) %
Sweet potatoes	6.8 (12.8) %
Groundnuts	53.2 (31.3) %
Source: CSO, 2015.	

Eastern Province's plateau has good soil quality and sufficient rainfall for agricultural production. Yet despite its vast groundwater and land resources, agriculture is underdeveloped (Neubert et. al., 2011). This is unfortunate, as agriculture has the potential to increase economic growth and food and nutrition security. The **climate** in Eastern Province has three main seasons: a rainy season from November to April, a cool dry season from May to August and a hot dry season from September to October (see Figure 1). This results in one harvest of field crops a year and one off-season permitting irrigated horticulture.

The projects districts Katete and Petauke are mainly covered by cropland and low dense forest. The valley region is generally suitable for drought tolerant crops such as sorghum, finger millet and tobacco (Simute et al., 1998).

Maize[20] is the main staple in Eastern Province and is produced by 95.3 % of the farmers (Table 8; Central Statistical Office 2015). Net buyers, net sellers and self-sufficient farmers account for 68.7 %, 30.5 % and 0.7 % of agricultural production in Eastern Province, respectively. Chicken is the most common and widespread domesticated animal of rural households (IAPRI, 2015).

[20] Maize flour is used to make nshima, a thick porridge eaten with relish. Nshima is the main source of energy in the Zambian diet (Nyirenda et al., 2007).



Month	Temp	Precip
Jan	22.8	266.5
Feb	22.9	204.5
Mar	23.0	158.1
Apr	21.9	42.7
May	20.6	6.2
Jun	18.6	0.6
Jul	18.2	0.0
Aug	19.9	0.0
Sep	23.1	0.5
Oct	24.9	15.0
Nov	25.3	54.5
Dec	24.0	202.4

Figure 1: Climate graph for Chipata, Eastern Province

Source: University of East Anglia, 2017.

Zambia´s nutrition policy environment

Zambia´s Vision 2030 lays out targets for achieving a "well-nourished and healthy population by 2030" (Kumar et al., 2018). Besides being an 'early riser' in the SUN movement (see Box 2), the government has adopted international targets such as the Sustainable Development Goals, the World Health Assembly targets to end malnutrition and the Comprehensive Africa Agricultural Development Program (CAADP) compact to improve Food and Nutrition Security (IIED, 2017).

In 2006, the Government of Zambia passed its first National Food and Nutrition Policy (NFNP), which incorporates disparate policies on breastfeeding and micronutrients (Harris et al., 2017). Until then, Zambia's nutrition policy environment was incoherent and uncoordinated across sectors, and incomplete within the nutrition sector (Harris and Drimie, 2012). The release of the NFNP brought nutrition into the focus of policy- makers and triggered a cascade of strategic plans, program documents, multi-sectoral district plans and guidance notes (Harris et al., 2017).

Health and agriculture as key sectors for nutrition

The 2016 Sixth National Development Plan (SNDP) describes nutrition as essential element for achieving the country's socio-economic development targets (Kumar

et al., 2018). The agricultural sector seeks to create national food security by producing sufficient amounts of maize and other staple foods. Maize is *the* staple food in Zambia. Maize production was heavily promoted by the colonial government (Neubert et al., 2011) and, since then, is encouraged by subsidies and uniform prices for inputs and crop producers. Prices for inputs are regulated by the Farmer Input Subsidy Programme (FISP) which was introduced in 2002, and prices for crop producers are regulated by the Food Reserve Agency (FRA), which was set up in 1972 and is based on the colonial idea of maize control boards. FRA buys maize from farmers at guaranteed prices and forms a strategic reserve to modulate national grain prices. These policies resulted in a gradual shift from the consumption of indigenous crops like millet, sorghum and cassava to maize — to the point that today, these indigenous staples are rarely consumed. Diets based on *nshima* (maize meal porridge) are preferred by most Zambians, providing meals that are high in starch yet generally low in nutrients (IIED, 2017).

The 2016 Second National Agriculture Policy (SNAP) describes the agriculture sector as a key driver of economic growth, and, like the first NAP (2004–2015), puts emphasis on increased production, sector liberalization, and commercialization.

The SNAP explicitly incorporates the twin goals of food diversity and healthy nutrition and defines food diversity as the "cultivation of crops other than maize". However, it disregards vegetables and fruits, bio-fortified crops, indigenous crops, nutrition education and the utilization of nutritious foods and yet has to define specific goals (IIED 2017, p. 11).

The Zambian Government increasingly considers nutrition security in its national policies, and its 5th National Health Strategic Plan (NHSP) seeks to improve the nutrition and food security of the population, particularly of children, adolescents and mothers in childbearing age. However, while the NHSP explicitly refers to the National Food and Nutrition Policy (NFNP), Vision 2030 and the Sixth National Development Plan, there have been few attempts to facilitate coordination between the health and the agricultural sector to address the multidimensional causes of malnutrition.

Food and nutrition governance

The 2006 National Food and Nutrition Policy (NFNP) addressed nutrition through a multi-sectoral approach involving the health and agriculture sectors and included a call for food diversification. Building on this approach, the 2011–2015 National Food and Nutrition Strategic Plan (NFNSP) pushed new multi-sector efforts to strengthen and expand interventions defined in the first Most Critical Days Programme (MCDP I, 2013–15). The MCDP I, which coordinated with the global

SUN movement, identified the promotion of improved child feeding and the diversification of maternal and child diets as priority areas (Kumar et al., 2018). The goal of its successor, the MCDP II, is to significantly reduce stunting among children under two years of age to 25 percent in targeted districts by 2022. This makes the MCDP II fundamental to the NFNSP goal of eliminating all forms of malnutrition across Zambia by 2030 (NFNC, 2018).

Decentralized multi-sector coordination

Zambia has instituted structures in multiple sectors at the national, provincial and district level to coordinate nutrition action. The National Food and Nutrition Commission (NFNC) was established under the auspices of the Ministry of Health to serve as an advisory body on food and nutrition issues (NFNC, 2018). The NFNC is the main driving force behind the MCDP I and II. It has spearheaded efforts to address the underlying causes of malnutrition, largely through coordinated and decentralised action at the national, provincial, district and communal level.

The FANSER project is mainstreaming food and nutrition security through the District Nutrition Coordinating Commission (DNCC) at the district level in Eastern Province. The aim of the DNCC (is to align nutrition interventions of ministries and civil society organisations. The Ward Nutrition Coordination Committees (WNCCs) were established to facilitate coordination at the community level (Concern Worldwide, 2017).

2.3.2 Maritime in Togo

Maritime is the southernmost of the five geographical regions of Togo and the country's capital, Lomé.

Maritime is divided into seven prefectures, including the projects areas of Vo, Bas-Mono and Yoto. As of 2014, 3,324,000 people lived in Maritime, spread over 6,396 km². With 520 inhabitants / km², the region is densely populated (Table 9.) The main religions are: Christianity and Islam along with traditional forms of Animism. The prefecture of Vo is considered to have the highest number of Voodoo practitioners in Togo (République Togolaise, 2018).

Table 9: Facts on the project region			
Facts on the projects' prefectures			
Prefecture	Bas-Mono	Vo	Yoto
Chef lieu	Afangan	Vogan	Tabligbo
Population	96,400	210,075	165,956
Area (km²)	288	714	1.250
Pop. Density (pers./km²)	335	294	133
Source: République Togolaise, 2018.			

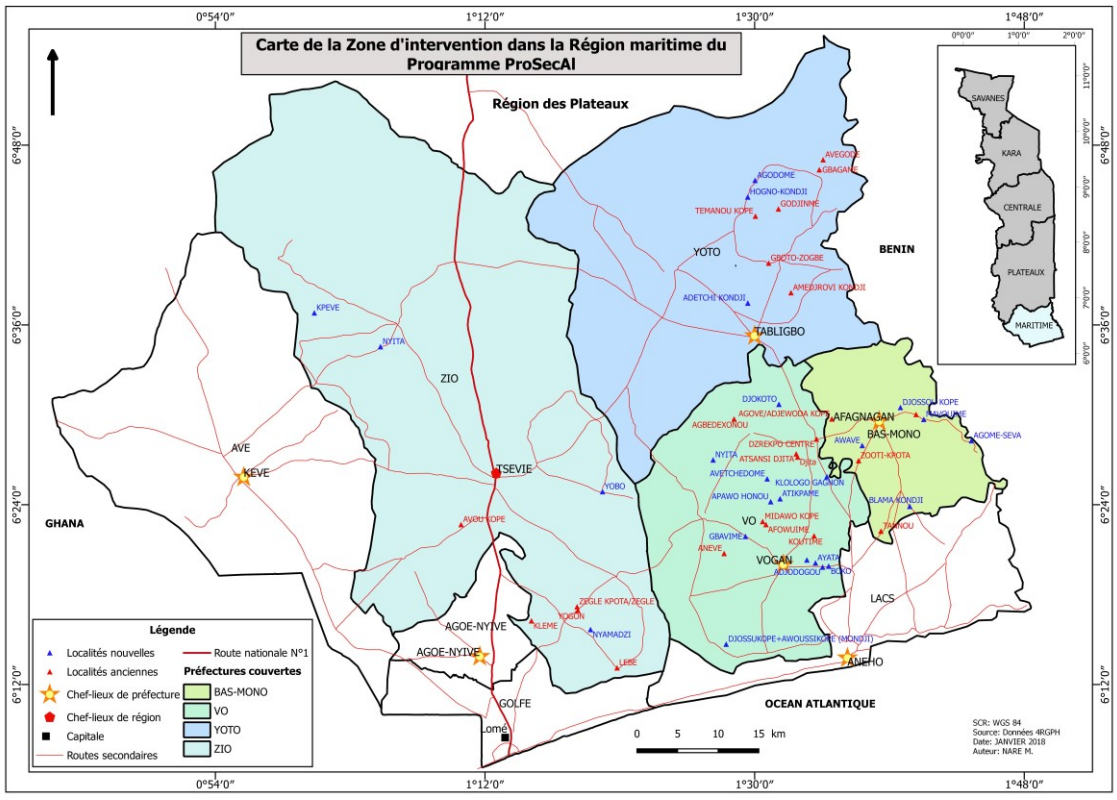
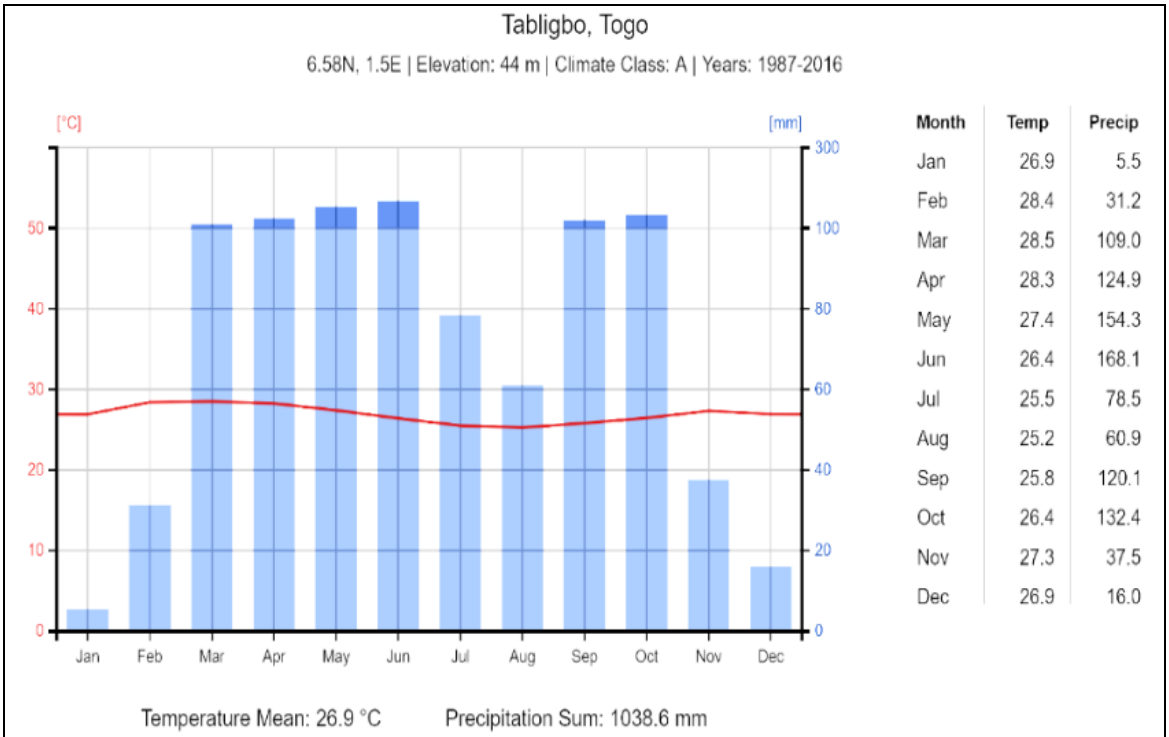


Figure 2: Project Region in Togo

Source: ProSecAl

In the three project prefectures (Figure 1; Bas-Mono, Vo, Yoto) households grow cereals (mainly maize, sorghum and rice), root crops (manioc, yam, sweet potato)

and legumes (peanuts and beans) and various vegetables[21]. The most common **cash crops** are cotton, palm oil and sugarcane. Many households keep chickens and goats (République Togolaise 2018). Cattle farming is mainly done by nomads (Abubakar, 2017; Virtanen, 2015). The Yoto prefecture has important phosphate deposits (Johnson, Rat and Lang, 2000).



Month	Temp	Precip
Jan	26.9	5.5
Feb	28.4	31.2
Mar	28.5	109.0
Apr	28.3	124.9
May	27.4	154.3
Jun	26.4	168.1
Jul	25.5	78.5
Aug	25.2	60.9
Sep	25.8	120.1
Oct	26.4	132.4
Nov	27.3	37.5
Dec	26.9	16.0

Figure 3: Climate of Tabligbo, Yoto

Source: University of East Anglia, 2017.

The region's climate (Figure 3) is tropical with an annual average of 26.9 °C. It is shaped by two rainy seasons, allowing two cultivation periods.

Nutrition policies in Togo

Food and nutrition insecurity remain a major issue in rural Togo. According to the Demographic and Health Survey (DHS), 27.5 % of children under five suffer from chronic malnutrition, 16 % from underweight and 6.5 % from acute malnutrition. Chronic energy deficit affects 6.9% of women of childbearing age. In 2013, 53 % of children under five were Vitamin A deficient (DHS, 2014).

[21] Ademe, Gbomba, tomatoes and Gombo are common in the region.

The **PND** (Plan national de Development 2018–2020) seeks to transform Togo into a middle-income country by 2030. The PND's 2030 and 2063 agendas focus on inclusive, sustainable economic growth by investing in: (1) the development of logistics and a trade hub; (2) the structural transformation of the economy; and (3) the progressive development of society and social inclusion (PND).

In 2012, the government of Togo launched the **National Program for Agricultural Investment and Food Security (PNIASA)**. The programme set out institutional reforms and strategies to boost the country's economic growth and to improve the living conditions of the rural population. PNIASA aims at improving the national availability of food (PASA), food and nutrition security (PADAT), and the agricultural trade balance (WAAP; Box 3).

Box 3: Objectives of PNIASA

PASA (Agricultural Sector Support Project / World Bank) aims to rehabilitate and strengthen the productive capacities of producers of strategic food products (rice, maize, sorghum, cassava, soybeans), of export products (coffee, cocoa, cotton), livestock products (poultry, small ruminants) and inland fisheries and farmed fish products (tilapia, catfish).

PADAT (Agricultural Development Support Project in Togo) contributes to the improvement of food security and the income of agricultural producers through, among other things, improved productivity of rice, maize and cassava cultivation. The intervention targets small producers, with no more than 3 ha, with the goal of improving knowledge, technical skills and production along with a yield boost of at least 50 %. This project was funded by IFAD (International Fund for Agricultural Development)

Togo's **WAAPP** (Agricultural Productivity Program in West Africa) aims to generate and accelerate the adoption of improved technologies for increased productivity in the country's priority sectors. It is financed by the World Bank and it is carried out all throughout West Africa.

Source: PND

According to official reports, the adequacy of average dietary energy intake increased by 14 % in between 2008–2010 and 2014–2016. This improvement is attributed to the reduction of the total prevalence of undernourishment from 24.2 % in 2005-2007 to 11.4 % in 2014–2016. In addition, the depth of the food

deficit decreased considerably, from 145 kcal / pers / day in 2008–2010 to 75 kcal / pers / day in 2014–2016.

The **National Program for Agricultural Investment and Food and Nutrition Security (PNIASAN;** 2017–26) aims to double the income of rural agricultural households, contribute to the reduction of malnutrition and halve the poverty rate in rural areas. PNIASAN consists of four components (Table 10):

Table 10: Components of the PNIASAN

Components of PNIASAN	
Agricultural value chains	Improving the organization of agricultural space and agricultural value chains. The objective is to anchor the development of agricultural value chains in high-potential territories while improving the performance of agricultural value chains
Agricultural productivity	Improving productivity in agricultural sectors and the economic valorization of the products. The objective is to increase yields over the long term, and to diversify production in the plant, animal and fish industries. A further goal is to improve the availability of foods whose consumption contributes to improving the diets of vulnerable populations.
Resilience and nutrition	Improving the resilience and nutrition of rural populations. The aim is to improve rural diets and strengthen the capacity of rural communities to anticipate, adapt to, internal and exogenous shocks.
Governance	Improving the governance of the sector. The objective is to make the political, economic and social environment of the agricultural sector more favorable for achieving the objectives of PNIASAN.

Source: PNIASAN

PNIASAN is supported by several international technical and financial partners, including FAO, UNDP, WB, IFAD, GIZ and WFP. The GIZ/GfA has a coordinating role in the food and nutrition security sector. Like Zambia, Togo is a member of the **SUN Movement** (Box 2).

3 Conceptional framework and research design

3.1 Research objectives

The objective of this study is to identify important determinants of food and nutrition insecurity of the target group in the project regions. The study seeks to accelerate the overarching goals of the global programme objectives by:

A. Identifying the determinants that affect nutrition security in women and infants (see chapter 3.2)
B. Analysing potential pathways to improve sustainable nutrition behaviour by applying social behavioural change communication (SBCC) methods (see chapter 3.3)
C. Drafting recommendations to improve the dietary diversity of small children (6–23 months) and women in reproductive age.

The study team identified two approaches to guide the qualitative research and the analysis. In the following section, the conceptual framework is outlined, which is based on the UNICEF model (2015) and the SBCC approach focusing on communication channels to address food and nutrition security (Lamstein et al., 2014).

3.2 Determinants of food and nutrition security

This study employed the UNICEF framework for mother and child nutrition (2015; see annex p. 182) to guide the empirical research. The empirical research puts special focus on access to and the availability of resources for target group households.

Based on the UNICEF framework, three types of determinants affecting mother and child nutrition were defined: (1) immediate, (2) underlying and (3) basic (Figure 4).

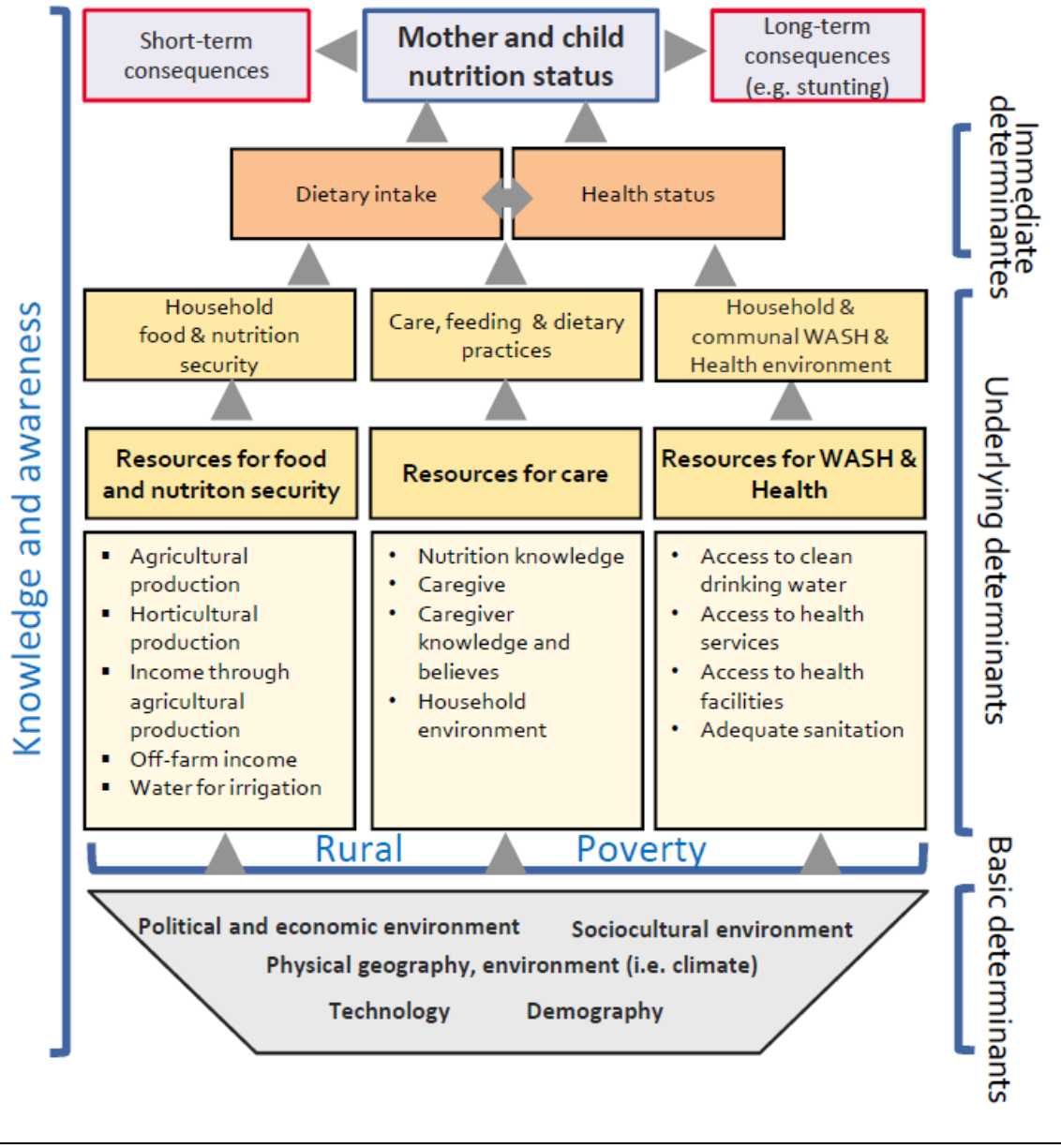


Figure 4: Conceptual framework guiding empirical analysis

Source: Own illustration, adapted from UNICEF, 2015; Smith and Haddad, 2015.

Dietary intake and the health status are interrelated and i**mmediate determinants**: A mother or child with a poor dietary intake is more susceptible to diseases. On the other hand, diseases and infections might lead to poor dietary intake. For example, sick mothers have less time available for childcare, house- and field work and/or income generation and therefore have difficulties to improve their household's food and nutrition security.

The **underlying determinants** define the household's resources to secure food and nutrition (such as agricultural production and its characteristics, income), the

quality of care (and support) for mothers and their children and the WASH & health environment.

Basic determinants manifest at a broader (geographical) regional, national and global level. They represent the economic (income possibilities), political (stability, accountability), social and cultural environment which determine the undernutrition of the target group (Smith and Haddad, 2015; UNICEF, 2015)

Knowledge and awareness (on the left) describes the importance of information on nutrition and related topics for the target group and communities. Suitable communication approaches are outlined under SBCC (3.3). This conceptual framework includes rural poverty as an influencing factor on resources on care, health, and food (Smith and Haddad, 2015).

3.3 Social and behaviour change communication approach

The team adapted the **Social and behaviour change communication approach (SBCC)** of Lamstein et al. (2014) to investigate the communication process of the programme interventions. This approach focuses on improving the target's group access of knowledge and information on food and nutrition (Lamstein et al., 2014).

The SBCC approach (Figure 5) explains communication tools and channels but it **neglects various factors** such as the socio-economic and environmental determinants of mother and child nutrition security. Still, the SBCC approach is a useful and complementary concept to the conceptual framework on mother and child nutrition (see chapter 3.3). The SBCC strategies combine practical community-based events, multiple-media communication and face-to-face meetings (Nguyen et al., 2016; Rollins et al., 2016; Sinha et al., 2015).

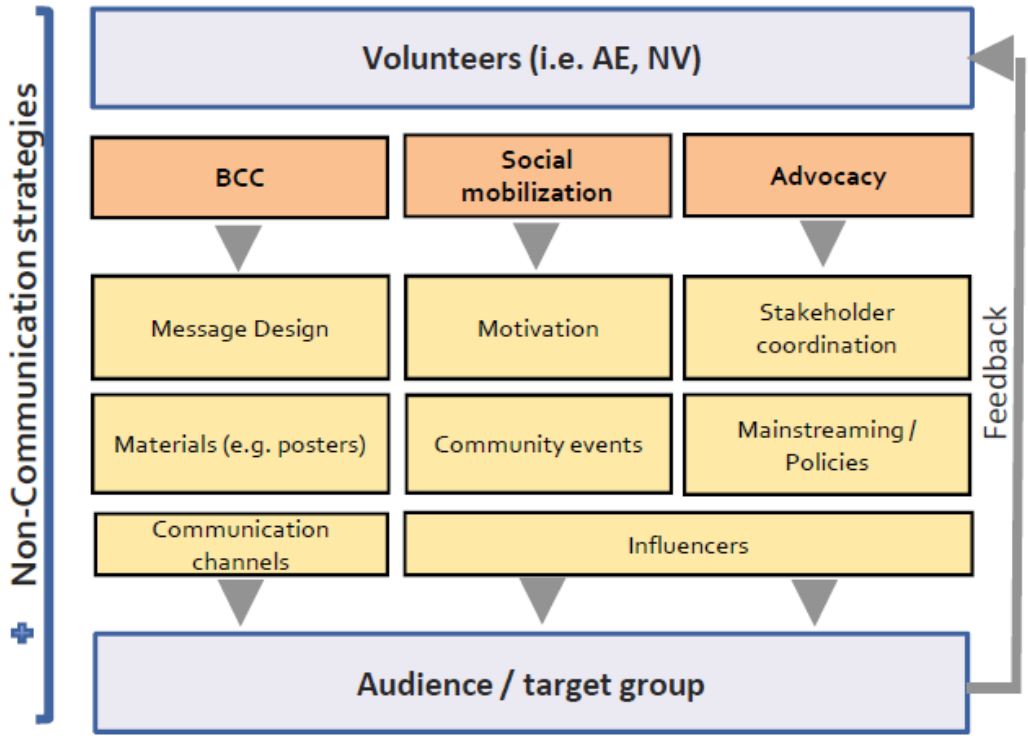


Figure 5: Social behaviour change communication

Source: Own illustration, adapted from Lamstein et al. 2014.

When combined, these efforts are said to increase the effectiveness of interventions (Ruel et al., 2018). SBCC can be applied to health and nutrition interventions to help "individuals, households, groups, and communities" change their behaviour by adopting and maintaining improved health and nutrition practices. The SBCC approach seeks to provide information on adopting and maintaining high-impact nutrition-specific behaviours to a wide range of individuals, families, communities, institutions and countries (USAID-SPRING and GAIN, 2014).The theoretical concept of SBCC consists of three key activities (Table 11).

Table 11: The three components of the Social behaviour change communication approach

Components of the SBCC approach (Lamstein et al., 2014)	
Behaviour change communication (BCC)	BCC describes the communication process to its beneficiaries. Direct face-to-face dialogue with the target group informs, motivates and addresses problems about relevant topics. BCC activities "typically target those who need to adopt and sustain priority practices (mothers, fathers, caregivers, and service providers) and may occur at home, in the community, or at a facility". An example of a face-to-face dialogue is a cooking demonstration teaching participant about recipes, healthy diets and how to integrate them in their daily lives.
Advocacy	Advocacy "informs and motivates to create a supportive environment to achieve program objectives and development goals. Advocacy creates awareness and encourages leaders to take actions to enable the adoption of promoted practices". This includes policy developments and recommended actions for decision makers and authorities that support desired outcomes.
Community and social mobilization	Community and social mobilization "engages and supports the participation of institutions, community networks, social/civic and religious groups to shift attitudes, structures, and norms to better support priority practices. "(C-Change, 2012; Lamstein et al., 2014).
Source: Lamstein et al.,2014.	

Interpersonal communication is said to be effective in reaching smallholder farmers and can deliver best-practice information and coaching on a range of topics - from agricultural production tips to care and feeding practices (Kuyper and Schneider, 2016; Kumar et al., 2018). Mass media stimulates individual and societal dialogue (Young et al., 2016) and many development initiatives use mass media communication channels to reach larger audiences with timely, relatively low-cost and often entertaining messages. Radio[22] is the most widely used broadcasting service amongst rural audiences in sub-Saharan Africa (Hudson et al., 2017; Myers, 2008).

The SEWOH-country packages place great value on delivering knowledge and information. In this context, this research investigates existing information

[22] For the purpose of this study, radio and mobile services and internet based social media were examined. Television and newspapers are not or less accessible in both rural areas.

channels and possible local influencers, i.e. communal change agents that could impact household decisions on nutrition and dietary outcomes of women and small children.

In line with the SBCC approach, this research evaluates the following communication and behavioural parameters:

- **Influencers:** Who are key persons and influencers within the communities that can serve as change agents?
- **Volunteers / staff:** Which role do the volunteers and the affiliated staff play?
- **Information processes:** How do the programmes reach the target group and how can it be extended?
- **Media channels:** Which are suitable media channels for information dissemination?
- **Social mobilization:** Which role do community events play in the information dissemination process?
- **Non-communication strategies:** Which incentives can contribute to achieve the programme goals? Does the distribution of favourable products support the process (e.g. growth charts)?

4 Methodology

This research facilitates an investigation of the **multiple causes of food and nutrition security**, of the role of (social) behaviour change communication strategies and of interventions to improve the nutrition situation of the target group.

Multi-method approach

This research employed a mixed-method approach that involved a quantitative regression analysis on food and nutrition security in both project regions and qualitative participatory methods exploring the target group's dietary behaviour. During the field research, the team worked with researchers and scientists of various disciplines from the University of Zambia (UNZA) and the Université de Lomé (UL) (see annex, p. 201). The researchers from Togo and Zambia were co-supervised by the cooperation partners in Zambia (IAPRI) and Togo (ITRA). Affiliated individuals of FANSER in Zambia and ProSecAl in Togo were also part of the research team.

The research phases

Table 12 outlines the data collection that took place in five consecutive phases.

Table 12: The different research phases of this empirical research in both districts

Research phases	Content
Phase 1 Analysis of the baseline study	The quantitative data of the Nutrition Baseline Surveys (2015) served as a basis for the development and design of the methods (see chapter 2). Describing a typical rural household, the researchers applied bivariate regression analysis using Stata® to correlate the dependent variable with various explaining variables.
Phase 2 Participatory observation	The team stayed in three groups with rural households. This offered an important opportunity to gain insight into the routines of the local community.
Phase 3 Pre-test	Looking at the results of phase 1 and 2, the methods were continuously adapted and tested on reliability and validity.
Phase 4 Empirical research in the villages	The researchers accompanied local authorities on transect walks to gain insights into local aspects of food and nutrition security. This was followed by focus group discussions (FGDs) in communities with different groups of people (e.g. women, beneficiaries, grandmothers). In the FGDs, different tools (e.g. household gender dynamics, seasonal calendars, resource cards) are employed to explore the factors that drive the dietary habits of the target groups (also see Selener, Endara and Carvajal 1999). Parallel to the FGDs, the team conducted semi-structured key informant interviews with programme agents, community leaders, health workers, mothers, etc.
Phase 5 Expert interviews and workshops	Prior, during and after field research, the team conducted guideline-based expert interviews with agricultural experts, political office holders and project officers from other developmental organisations to gather background information on findings, contexts and interventions and to develop recommendations.

Source: Own illustration.

Selection of research sites

GIZ selected Zambia (FANSER) and Togo (ProSecAl) as research sites as both countries share aspects of food and nutrition (in)security but differ in climate, geography and governance (a centralised system in Togo, and a multi-party, decentralised system in Zambia). Logistical requirements and local capacities of GIZ country programmes supported the selection of these two research sites. This research cooperates with the global programme "SEWOH Food and nutrition

security, enhanced resilience," and thus focuses on the same **target groups**[23] and the same **project regions** in Zambia and in Togo.

Participating villages[24] were selected by the local implementation agencies. The main criteria of selection were differences in accessibility and infrastructure endowments, distance to markets and population size.

In order to establish a counter-factual and to gain a better understanding of the interventions' impact, the research team collected data from beneficiary and non-beneficiary villages as well as from non-beneficiary households within the beneficiary villages. The team spent the same amount of time in all the villages (beneficiary and non-beneficiary) in both project regions.

The empirical research in Zambia took place in August during the dry season and at the beginning of the hungry season. In Togo, the households were surveyed in September during the middle of the short rainy season. These different seasonal circumstances are considered in the analysis of the results.

4.1 Data analysis and multi-methods approach

The **analysis of the quantitative data** of the nutrition baseline surveys from Zambia (2015) and Togo (2016) served two purposes:

- to identify key characteristics of food and nutrition security of the target population
- to guide the design of the qualitative research by identifying factors that are statistically linked to food and nutrition security

In order to overcome the lack of causality in descriptive statistics, multivariate regression analysis techniques seek to identify various determining factors of food and nutrition security. Calculations were performed using the software programme Stata. ®

To compare households, the team used data collected in the baseline studies (see 2.2) that describes an "average" household and collated it with data that represents a "typical undernourished household". A **typical undernourished** household is characterized by: (1) houses at least one child who does not receive the minimum acceptable diet (MAD), (2) is home to a mother whose diet does not meet the

[23] After the SEWOH project (2018) expanded, the number of beneficiaries increased.

[24] The villages in this study are part of the baseline research areas but the data did not allow to identify single villages for possible qualitative follow-ups

women's minimum dietary diversity (MDD-W) intake and (3) is classified as moderately to severely food insecure according to the household food insecurity score (for indicators see Box 4.) To investigate the factors that influence undernutrition and to identify determinants (explanatory variables), a multiple regression analysis was conducted. Drawing on a number of related studies (Azeb, 2013; Brown et al., 2014; Issaka et al., 2015a, b; Mitchodigni et al., 2017), five groups of potential explanatory variables that influence the dietary diversity of the target group were identified:

Box 4: Potential explanatory variables influencing dietary diversity

1. **Socio-economic characteristics of households**: (1) the district (Katete/Petauke); (2) the sex of the household head;(3) household income sources;(4) the marital status of the mother; (5) number of members.
2. **Household food insecurity**: the food insecurity severity experienced by households as expressed by the HFIES indicator.
3. **Production diversity and assets:** (1) number of different crops produced by the household (0-6 crops); (2) access to a vegetable garden.
4. **Social support**: (1) nutrition counselling, (2) care support, (3) number of clinic visits for children under 5.
5. **Child, maternal and caregiver characteristics**: (1) child's age (may affect the choice of adequate complementary foods); (2) mother's age (may reflect her experience); (3) mother's education level (may affect her knowledge).

Source: Azeb, 2013; Brown et al., 2014; Issaka et al., 2015a, b; Mitchodigni et al., 2017.

The **qualitative data analysis** is based on the grounded theory approach developed by Mayring (2000). Having determined the inductive analysis pathway along with the research objectives and questions, thematic categories were developed by using the UNICEF framework and insights from the baseline data. Predefined categories were controlled against the data collected and, where necessary, new categories defined. Besides verbal references by participants, the frequency / reoccurrence of an issue indicated additional relevance. Table 13 gives an overview of the empirical methods in both project regions.

Table 13: Overview of the empirical methods

Method	Zambia	Togo	Total
PRA	56	76	132
Thematic focus group discussion	37	63	100
Participatory observation	6	2	8
Transect walk	13	11	24
Interviews and memos	108	69	177
Semi-structured interview mother	21	13	34
Semi-structured interview woman	1	3	4
Semi-structured interview father	2	2	4
Key-informant interview / memo	56	29	85
Expert interview / memo	28	22	50
Total (PRA and Interviews)	**164**	**145**	**309**

Source: Own data.

The recommendations were co-jointly developed with researchers, beneficiaries and local partners in workshops during and after field research and elaborated in expert and background interviews. The recommendations are given to GIZ, its implementing agencies and other organisations in this field. The recommendations address the general situation of the target group and seek to improve their obstacles in achieving food and nutrition security in both Maritime and Eastern Province.

5 Food and nutrition security in Zambia

5.1 Quantitative regression analysis

A typical household in Eastern Province

The baseline data describes the **average household** (see table A, annexe p.185, row 1 and 3) with the following characteristics: The household has 5.76 members, is headed by a male, and adults are in a monogamous relationship (75 %). Nearly all households (99 %) have **access to land** (data on the size of the land was not collected). 1 out of 3 households practises horticultural cultivation. **Income generation** is based on agriculture. The predominant activity is the marketing of crops (92 %), other activities include occasional labour (37 %) and small business activities (37 %). The sale of animal products (15 %) is rare. Remittances do not play a role (1 %). Data shows that the average age of the mother is 27 years and that she went to school for 3.5 years. Every second mother receives support for childcare (47 %) and a vast majority received nutrition counselling through Health Surveillance Assistance (HAS) and volunteer groups (63 %).

In contrast, the regression analysis shows that a typical undernourished household has more members and that the mother received fewer years of schooling. Interestingly, the age of the mother plays an ambivalent role: with advancing age of the mother, the likelihood of a diverse diet decreases whereas the food security of her household increases. In terms of income sources, households that do not meet WMDD (Minimum dietary diversity women) and households that are moderately or severely food insecure (HFIES) earn less income from small businesses and depend more on irregular (temporarily) income. Statistically, the typical undernourished household has limited access to nutrition counselling.

Surprisingly, the quantitative results do not show statistically significant differences in the production quantity of crops and vegetables of typical well-nourished and typical undernourished households. This indicates that well-nourished households complement their diet by purchasing additional food items, suggesting that financial resources and nutrition counselling influence food consumption choices.

Interrelations between food and nutrition security indicators

The indicators of undernourishment are statistically interrelated (see Box 5)[25]. Unsurprisingly, the proportion of children who receive the Minimum Acceptable Diet (MAD) is more than double in the group of women with sufficiently diverse diets than in the group of women with insufficiently diverse diets. The same relation holds true for the frequency of meals a child receives. However, these indicators are not sufficient to describe a typical undernourished household and their interrelation should not be mistaken for assigning causality. So, to combine all those explaining factors and to come closer to assigning causality, regression methods are used to analyse which factors contribute to undernourishment.

Box 5: Indicators used in the baseline studies

Relevant indicators: *The baseline studies measured Food insecurity and dietary diversity by three indicators: Dietary Diversity Score (IDDS)* consists of seven food groups for children (6-23 months; IDDS-CH) and ten food groups for women (IDDS-W). *Minimum Dietary Diversity (MDD)* is defined as the minimum intake of four food groups by children (MDD) and five food groups by women (MDD-W)(Kennedy et al., 2017). Minimum Meal Frequency (MMF) refers to meal frequency of children depending on age (WHO 2008).The FIES-H is a statistical measurement scale to measure the observed severity of food insecurity at the household level (FAO 2015).

Source: FAO, 2015; WHO, 2008.

Factors associated with food and nutrition security

The multiple regression analysis (annexe p. 188) uses the explanatory variables to analyse the determinants of IDDS-CH (row 1 and 2), MMF, MAD (row 3 and 4) and IDDS-W (row 5 and 6). Table 14 summarizes associated factors for individual indicators regarding food and nutrition security of women and children.

25 Referring to MAD, WMDD, HFIES. This means those who meet the criteria of undernourishment in one definition usually meet the criteria of the others.

Table 14: Associated factors regarding FNS of women and children	
Dependent variables	**Statistically significant independent variables**
IDDS-CH (regression includes HFIES)	Breastfeeding of children (--), children's age (++), nutrition counselling (HSA and volunteer group ++), number of clinic visits for children under 5 (++), HFIES (-)
MMF	Breastfeeding of children (++), income of business / petty trade (+), nutrition counselling from volunteer group (+)
MAD	Breastfeeding of children (++), income of business / petty trade (+), nutrition counselling (HSA and volunteer group; ++), children´s age (++), care support by older sibling (--)
IDDS-W (regression includes HFIES)	Katete district (-), income from the sale of animal products (+), income of business / petty trade (+), number of household members (-), crop diversity (+), access to HSA (++), level of education (++), HFIES (--)
Source: Results based on statistical analysis.	

Positive and large positive associations are indicated by ("+" for 90 % - or more - level of significance) and ("++" for 95 % - or more - level of significance), respectively. Negative and large negative associations are indicated by (-) and (- -), respectively.

Dietary diversity of children

The regression analysis indicates that nutrition counselling has a positive effect on dietary diversity of women and children in typical undernourished households: nutrition counselling received through Health Surveillance Assistance (HAS, 53,25 %) and through volunteer groups (11,5 %) are statistically effective instruments for increasing the consumption of diverse foods.

In addition, the statistics show that clinic visits for children under 5 increase the likelihood of children eating a diverse diet. This highlights the importance of governmental nutrition counselling, particularly for undernourished households whose children are susceptible to stunting. Earning income (i.e. petty trade, small business activity) also increases the dietary diversity in typical undernourished households, and is positively associated with MAD, MMF, and IDDS-W.

The positive association of children's dietary diversity (IDDS-CH) and children's age, however, illustrates the poor quality of infants' diet (6–11 months). Despite their need for diverse food intake, infants received a lower diversity of foods than

older children. This confirms trends observed in other African countries (Issaka et al., 2015b; Melkam et al., 2013; Mitchodigni et al., 2017). The higher dietary diversity among older children could be attributed to the fact that children are the main collectors of wild food items in Eastern Province (Mofya-Mukuka, 2015).

Socio-demographic determinants such as sex of household head, marital status, age of the respondent and production diversity show no correlation with the dietary diversity of children.

Minimum Acceptable Diet and Minimum Meal Frequency

Business income, nutrition counselling and care support are positively associated with **complementary feeding practices**. Caregiving by older siblings negatively affects the minimum meal frequency needed to meet a child's nutritional requirements. This might be related to the high work burden of their primary caretaker. Mitchodigni et al. (2017) found that caregivers' occupations are one of the main factors affecting complementary feeding practices, especially when it comes to children's minimum meal frequency. Furthermore, secondary care takers such as siblings may have limited knowledge on feeding practices and the dietary needs of infants (Mitchodigni et al., 2017).

Dietary diversity of women associated with income generation

The regression analysis (see p. 185, table Z2) shows differences in income between undernourished and non-undernourished households, indicating that dietary decisions are influenced by a household's annual income. The sale of animal products and petty trade are associated with higher dietary diversity among children and women, highlighting the importance of additional income sources. This equally underscores the importance of encouraging women to diversify their income sources (i.e. by diversifying agricultural production, food processing, off-farm income activities) to diversify the diet of the household. However, time poverty might constrain women's earning opportunities.

The regression also shows that more years of schooling have a positive effect on women´s dietary outcomes. Furthermore, nutrition counselling from Health Surveillance Assistance (HSA) significantly influences the dietary diversity of both women and children. While other studies have found a link between agricultural production and dietary diversity (Mitchodigni et al., 2017), the regressions only show a robust correlation between crop variety and dietary outcomes of women but not of children. In addition, the statistics show that horticultural production does not increase the likelihood of higher dietary diversity among women and

children. This indicates that households that engage in gardening do not consume their produce and might sell it instead.

In the following, the qualitative research results will shed light on the influence of the diversification of agricultural production on the dietary practices of women and small children.

5.2 Qualitative Findings Zambia

5.2.1 Market infrastructure and business environment

Markets connect consumers and producers and facilitate the purchase and sale of food. Quick and easy market access is especially important for producers when there is no way to store harvest or when storage facilities are of low quality, increasing the likelihood of infestation or decay and decreasing the produce's value (CFS, 2016).

Kumar et al. (2018) analyse the link of **market access** and nutrition in Zambia and discern that many individuals must supplement their diet with local supplies as they are unable to grow enough food groups (Kumar et al., 2018). Looking at Malawi, Koppmair et al. (2017) argue that improving farmer's market access diversifies diets more than production diversification and that more efforts should be made to enhance farmer's market integration (Koppmair et al., 2017). In line with Koppmair et al., the quantitative analysis of this study shows a positive impact of **income diversification** on food and nutrition security indicators.

Favourable market prices and the gross margin per hectare are the main (dis-) incentives for farmers to (continue or stop) producing a certain crop. However, various crop prices are prone to fluctuation, as reported by the Ministry of Agriculture (Expert interview – Chipata). Exemplary, in the harvest season 2017/18, many Zambian farmers had difficulties to secure their income when prices for soybeans dropped by 44 %, with the lowest prices found in Eastern Province (Chapoto et al., 2018).

Market access in Eastern Province

Almost all households sell part of their harvests (95 % in Katete, 89 % in Petauke). Farmers either sell maize to the Federal Reserve Agency (see Box 6) or to individuals at markets.

Box 6: The Food Reserve Agency

The **Food Reserve Agency (FRA)** was created in 1995 to administer food reserves, facilitate markets and manage national storage facilities. The FRA purchases maize from smallholder farmers at a set price that typically exceeds maize market prices in areas of surplus production. The purpose is to guarantee a reliable supply of agricultural commodities for the country and to meet local shortfalls in times of emergencies caused by drought, floods and other natural disasters. The FRA also takes care of food reserves, price stabilisation and essential food supply. Many criticise the FRA for interfering in the private market.

Source: Interview WFP, Farmers Union.

Farmers commonly sell their products directly after harvest, when prices are low (and often "rebuy" when prices are high, see 101), leading to a small or no profit margin. Various experts said that market prices for maize can vary from 30 to 60 % within a year.

In the project region, many farmers have difficulties to access markets. Common access barriers are summarized in Table 15.

Table 15: Barriers in reaching markets

Farmers' market access barriers	
Lack of transport means and possibilities	Only few farmers have their own means of transport. Many rent one to transport their products to local markets. Typically, they commute by ox cart, bicycle or motorbike. Women are often not allowed to transport products by themselves, limiting their access to markets (see 5.2.3.).
Limited accessibility	Low population density and long distances to neighbouring villages and urban centres. This also results in little awareness on product prices in other locations.
Lack of infrastructure	Deficient public transport services and insufficient road infrastructure limit farmers to commute

Source: Own data.

The FRA sets prices above market rates. Those who cannot afford them are sent to FRA depots where they can purchase cheaper products. Formalized markets are

often beyond reach, since farmers have difficulties to meet the requirements in production quantity and quality (Neubert et. al., 2011).

Private companies pay less for the produce of smallholder farmers because of the relatively poor quality of their produce and their poor post-harvest management compared to large scale-farmers.

Farmers reported that they had difficulties to receive fair prices due to FRA policies, product-flooded markets or high transport costs reducing their profit margins. Whether the FRA reduces smallholders' poverty or not is a topic of frequent discussion. One problem for smallholders, especially in remote villages with limited access to information, is that the FRA's buying and selling activities are rarely announced in advance, which creates uncertainty about input availability (Fung et al., 2015).

Income generation and expenses

The regression results for Zambia show that women in households with business income are more likely to eat a diverse diet than women in households without a business-based income. Following the Central statistical office of Zambia (2014), the monthly per capita income in rural areas is 188.4 ZMK for males and 177.4 ZMK for females (CSO, 2014). However, only 4 % of households in the project region have a regular salary (Evan and Kuchenbecker, 2015).

While men mostly engage in marketing of crops (pure cash crops such as cotton and maize for household consumption and sale), women grow and sell food crops with lower profit margins and less demand such as vegetables (rape, tomato, beans), fruits and millet. Although women often pool their incomes, husbands have control over the households' finances and expenses, and women need to ask permission to spend money.

Livestock is rarely kept for regular consumption but rather serves as an asset in crisis (i.e. droughts, disease), a means of transport, or a source of cash for children's education. Despite challenges to find resources, most parents value education: "We have to spend the money on our children for their education," one parent said, "[b]ut coming up with the money to cover expenses like education is challenging" (Box 7).

Income generation and barriers for women

Women's involvement in small business activities follows seasonal patterns. They start after harvest when (if) the household has enough money and time at hand (Table 16). This seasonal investment pattern and the related uncertainty often obstruct long-term investments.

Box 7: Costs of education

Primary education is free, but families must purchase school uniforms and materials, which can amount to 750 ZMK/y. **Secondary schools** charge fees (~ 300 ZMK per child per term) and many families withdraw their children from schools as they are unable to afford them. Other reasons for low school attendance are anaemia, long distances to school and early pregnancies.

Source: Own data.

Table 16: Typical income generating activities of women

Income generating activities of women	
Sale of products	Women are involved in the sale of non-agricultural products within the villages. Typically, they sell additional food items (e.g. cooking oil, salt, sugar, sweets), hygiene products (e.g. soap and lotions) or cloths and fabrics - "Cloths sell faster than eggs"
Petty trade	To buy and re-sell goods in other locations such as in city markets can be profitable. But these activities are hampered by limited transport options and a lack of information on regional prices. Some, however, make high profits. An older mother from Chimbuwa (Katete) sells bananas at the clinic with a profit of 100 %. Typically, small fish (kapenta), groundnuts, reet mats, tobacco, vegetables (rape) or fruits (banana) are bought at cheap prices in town and sold in the village at a higher price.
Sale of own produce	Sale of food crops (e.g. vegetables and fruits) in neighbouring villages for income and to exploit price differences
Production/sale of goods	Few women produce products such as fritters, bread, charcoal and bricks and sell them within the communities. However, the production of these products requires investments.
Piece work	Some women work for a piece rate, especially during periods with no farming activities. For example, a woman from Kanjala (Petauke) sells groundnuts for 7 ZWA per 50 kg/bag (she produces one bag every two days) during the dry season.

Source: Own data.

Most women expressed the desire to engage in a side-business. However, many lack important resources (i.e. especially money and time) to launch a business. The household **expenditure** is mostly used to settle loans for agricultural inputs, pay

education-related expenses and (re-) buy livestock, and does not leave room for economic investments. Women who do not have a side-business described the various challenges that keep them from generating income (Table 17).

Table 17: Barriers in starting income activities

Barriers in starting income activities	
Income poverty through poor harvests	Low- and irregular-income harvests / yields. Limited surplus that prevents households from investing in side-businesses.
Lack of capital / loans	Poor access to loans. Contract farming, in which private companies set prices, was given, but not popular. Women expressed an interest in starting a community banking system to launch individual businesses.
Lack of training	The lack of suitable (business) training often leads to fears of losing money and being not successful in generating income.
Time poverty	Underestimation of the necessary (extra) work time to start a business. This can lead to failure. Many women can only dedicate time to a side-business during off-season.
Low demand	Non-competitive prices for consumers and low domestic purchasing power and demand / customers.

Source: Own data.

5.2.2 Intra-household allocation

The pathway from women's empowerment to improved nutrition and food security is influenced by decision-making power within households (Malapit et al., 2014). Strengthening women's bargaining power[26] and control over resources is key to increasing the allocation of income to a household's food budget (Duflo and Udry, 2004; Hoddinott and Haddad, 1995; Mofya-Mukuka and Sambo, 2018). The extent of women´s control over money, cash earnings and expenditures also plays a crucial role for household's food security (Eswaran, 2014).

[26] Anderson et al. (2017) argue that higher education for women in Tanzania increases women's authority in cash decisions, thus improving their bargaining power.

Looking at the RAIN[27] project in Zambia, Kumar et al. (2018) show that nutrition and gender-sensitive agricultural practices led to significant increases in women's social capital and improved their access to and control over agricultural decision-making. However, these practices had no impact on decision-making power in non-agricultural areas (e.g. spending on child education, health and food) (Kumar et al., 2018).

Ruel and Alderman (2013) find that the time women allocate to agriculture has an impact on their own nutrition and that of their children (Ruel and Alderman, 2013). One of the most laborious activities for women in rural settings is food preparation (Johnston et al., 2018).

Intra-household allocation in Eastern Province

Research attests a dualism in formal and informal participation of women in Zambia; despite having formal equal rights, many women suffer from limited access to education, interaction with public services, technologies and credits (Mo Ibrahim Foundation, 2019; Neubert et. al., 2011). As expected, the findings show an uneven intra-household labour division coupled with women's limited bargaining power and high work-burden. The time burden is greatest during the peak of the rainy season, during which pregnant women are especially vulnerable, as they usually work right up until childbirth while caring for their other children.

FANSER interventions address health and feeding practices to strengthen women's bargaining power on health, education and food decisions in the household. However, conservative gender roles and male resistance to renounce household power are a barrier to change, as reported by experts.

Household's spousal bargaining power and decision-making

Gender roles and household dynamics are major obstacles to improving the nutrition status of the target group. Women stated that their control over agricultural products was limited. The study of Mofya-Mukuka and Sambo (2018) highlights women's limited financial control over different agricultural crops (Table 18).

[27] The Realigning Agriculture to Improve Nutrition (RAIN) project was a partnership between Concern Worldwide, Mumbwa Child Development Agency (MCDA) and the International Food Policy Research Institute (IFPRI). Its objective was to design, implement and evaluate a model for integrated multi-sectoral interventions to reduce the prevalence of chronic malnutrition in Mumbwa district of Zambia's Central Province.

Table 18: Control over income from different crops	
Women's control of selected crops (in %)	
Groundnuts	47.9
Fruits and vegetables	43.6
Livestock	38.9
Beans	33.4
Maize	22.4
Source: Mofya-Mukuka and Sambo, 2018.	

However, male farmers reported that women's bargaining power and control over household resources increased (see Table 19). Following the farmers' accounts, this increase can be attributed to extension services and gender trainings.

Experts and women reported that gender roles are slowly changing with regard to food preparation and consumption. For instances, boys are only little involved in food preparation.

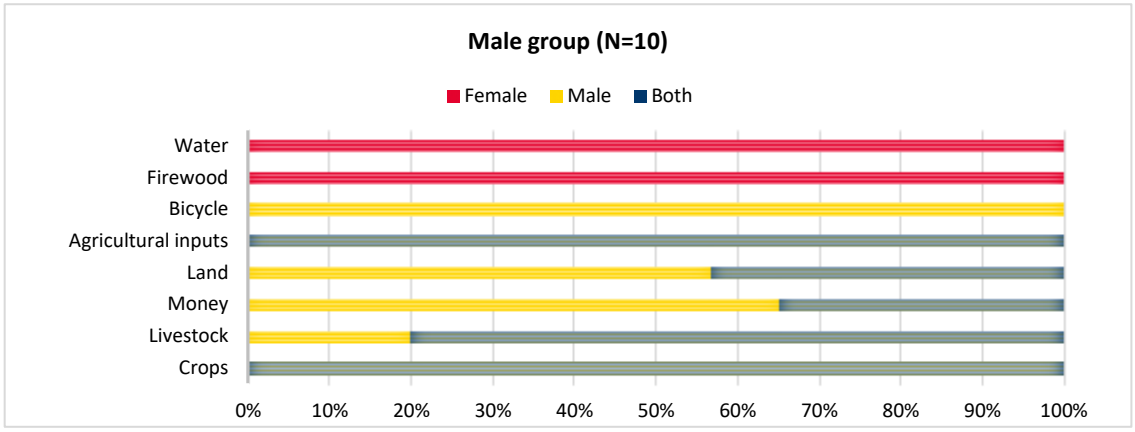
Table 19: Control of household resources	
Control of household resources	
Water & firewood	Water and firewood for daily household activities (i.e. cooking, laundry, household hygiene) are the sole responsibility of women. In the community, men control the administration of water sources.
Transport	Bicycles are the most important mean of transport in the region (ZDHS, 2015).[28] Even though both spouses use bicycles, men control them. Women who need to use them must get their husband's permission first. This is even the case when the women are the ones who bought the bicycle.
Agricultural production	Control of income from agricultural production depends on the crop (see table 16). The findings indicate that men control income from typical cash crops (i.e. maize, cotton) and women from crops with lower profit margins such as beans or millet (and vegetables)
Agricultural inputs	Women feel that they have little bargaining power over agricultural inputs and crops. Men justified their authority because they are "regarded as being more knowledgeable on what to grow" (FGD).
Land	In terms of control over (arable) land, the results show disagreement between men and women. Men justified their authority as they are the traditional heirs and thus the owner of the household's land.
Livestock	Though men and women own the same type of livestock, decisions regarding large livestock (cattle, goats, and sheep) are usually made by men. Women make decisions on smaller livestock (chickens, guinea fowls and ducks). Interestingly, women who own large livestock animals may hire men to manage them.
Food decisions	Women make food decisions with money allocated to them by the husband). However, their husbands sometimes veto their food decisions
Source: Own data.	

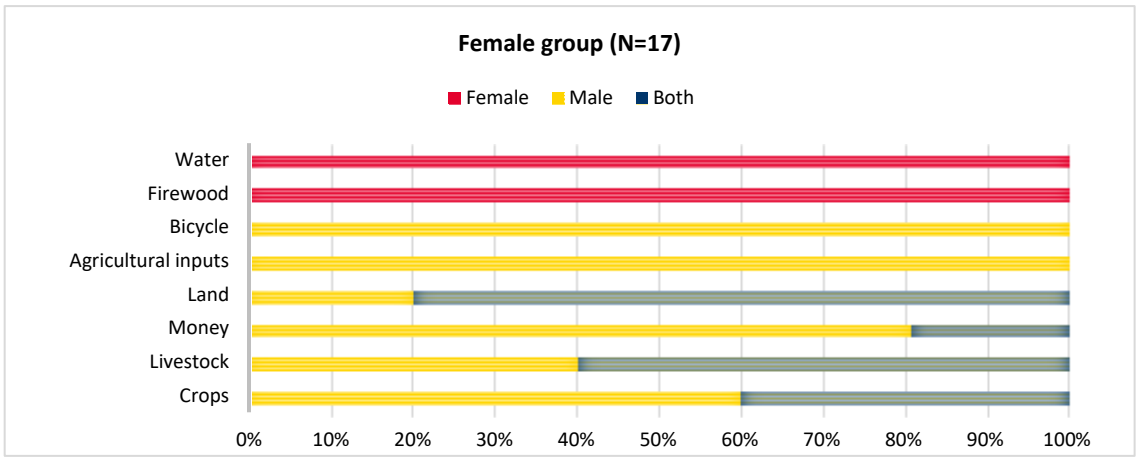
In most households, the consumption level of animal protein among women and children is lower than that of men. Although women decide what to cook, men often reserve the best and largest portions for themselves. In many households, children eat separately from their father or their parents. This conceals the discrepancies between the amounts of food items each household member gets.

[28] More than half (54 %) of households possess a bicycle. The other means of transport include animal-drawn carts (9 %), cars (2.5 %) and motorcycles (2 %) (ZDHS, 2015). Bicycles are used for clinic visits, for transport to work or to the maize mill.

The study contrasted views on the control of household resources affecting nutrition-, health- and care-related decisions. Strong disagreement emerged among some husbands and wives over agriculture related issues (Table 20).

Table 20: Male (above) vs. female perspectives on control of resources



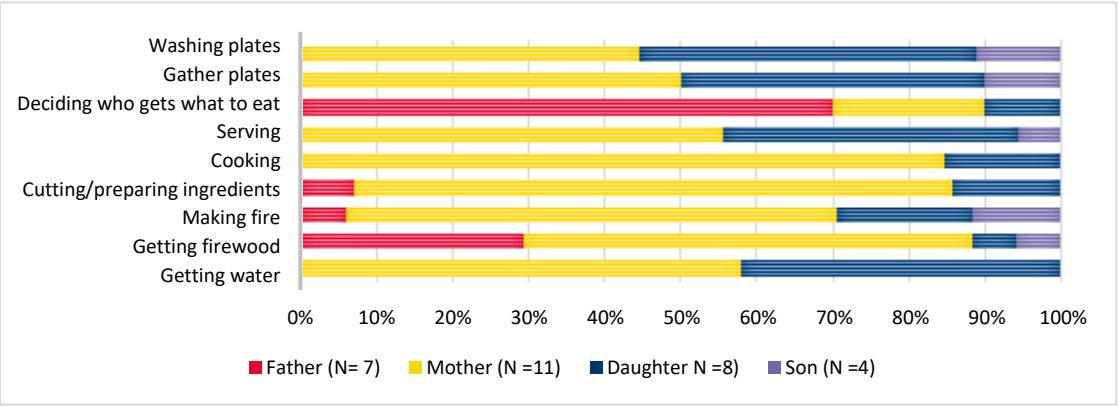


Source: Illustration based on 4 FGDs in Petauke and Katete.

Intra-household labour division and double burden of women

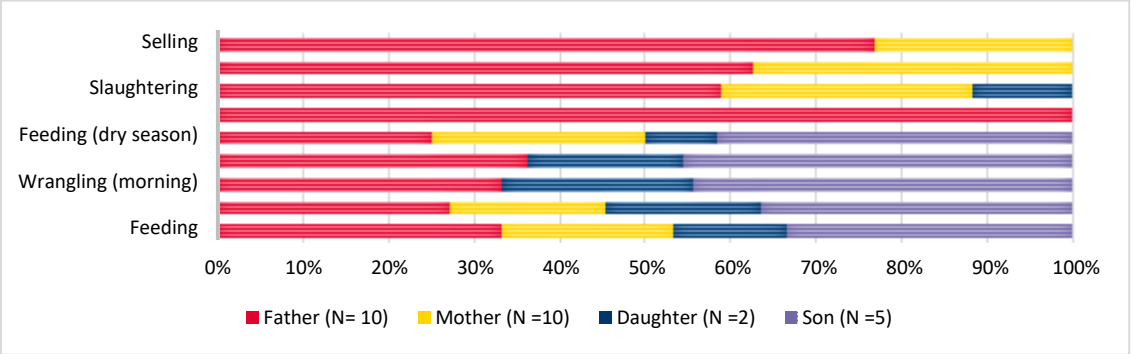
The following figures illustrate labour division within the household tasks. Following local accounts, women and their daughters perform the most time-consuming tasks (mostly related to the preparation of food) (Table 21). Women interviewed did not see specific ways to economize time. Table 22 shows that men oversee most of the livestock production, whereas farm labour is rather shared (Table 23).

Table 21: Household labour division in terms of food preparation



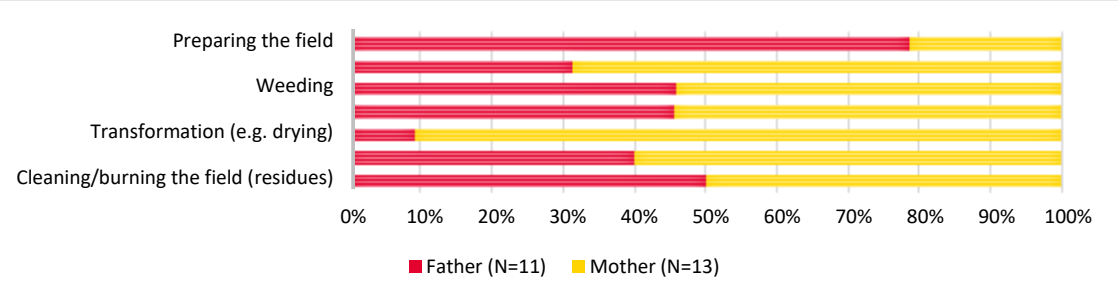
Source: Illustration based on interviews with the target group in Petauke and Katete.

Table 22: Household labour division concerning livestock



Source: Illustration based on interviews with the target group in Petauke and Katete.

Table 23: Farm labour division between spouses



Source: Illustration based on interviews with the target group in Petauke and Katete.

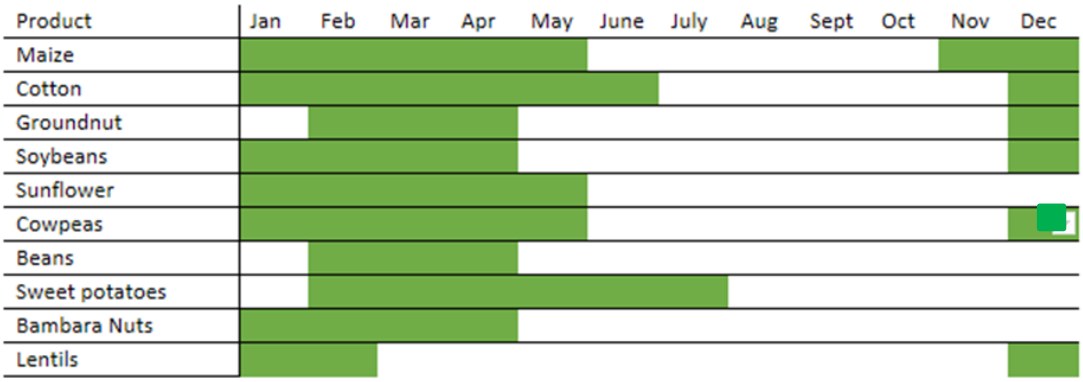
5.2.3 Agricultural production and food and nutrition security

Crop production

Since the colonial period[29], Zambian price policies and subsidies follow a single-crop policy concentrated on maize[30]. As a result, 99.5 % of the farmers grow maize (IAPRI, 2015). Other field crops include **groundnuts**, **cotton**, **sunflower** and **soybeans**. The cultivation of cassava (locally known as "poor men crop") is rare. Table 24 shows the seasonal calendar of a village in Katete district, indicating a decreased availability of most crops from May (leading to the hungry season; see p. 65). Sweet potato is available the longest, underlining its potential to strengthen resilience.

Table 24: Seasonal Calendar of Chimbuwa, Katete

Green marks: Harvesting season for the individual crop



Source: Focus group discussion in Chimbuwa, Katete.

The local organisation among smallholders is low - farmers rarely form community cooperatives to generate synergies (i.e. transport, storage). Farmers said they struggle to meet their own needs. Furthermore, farmers' trust in communal farmer associations and its benefits is low.

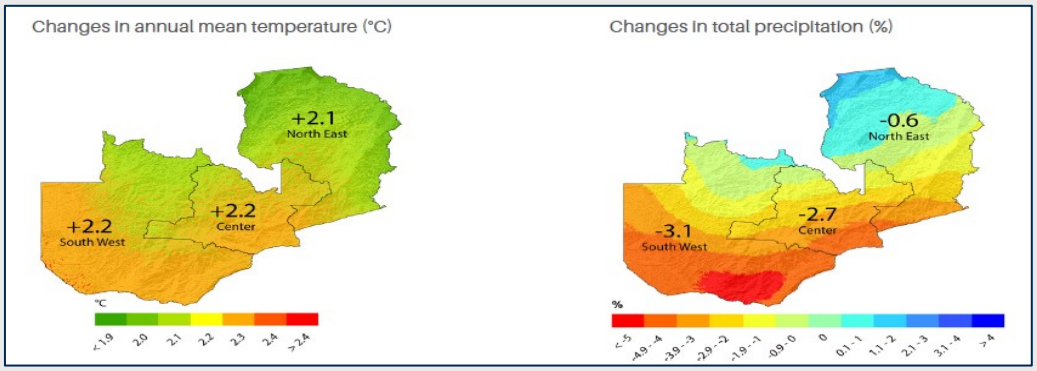
[29] Agricultural policies concentrated on maize were to provide inexpensive food to the urban population engaged in the mining sector and for the upper class (Neubert et. al., 2011).

Due to irregular rainfalls in the region, farmers, staff, volunteers and experts had lower maize and groundnut yields in the last years. Box 8 highlights farmers' statements on climate change.

Box 8: Information on climate change in Eastern Province

Climate Change in Eastern Province. Zambia's agricultural sector is highly dependent on rain-fed production and therefore vulnerable to climate change. The impacts of rising temperatures and shifting rainfall patterns are likely to have negative effects on food and nutrition security. Droughts continue to depress food production. Food insecurity threatens 80 % of the population in Zambia (FAO, 2018). The long-term average rainfall estimates in Eastern Province are between 900 and 1200 mm. In 2018, rainfall was only 600 mm (Farmers Union/Katete).

Farmers in both districts described shifting rainfall patterns that led to a shorter growing period and decreased productivity. They explained that the rainy season starts later in the year (in December; before it started in October) and that rainfall has become less regular. Following farmers, the last rainy season (2018) was very dry, resulting in low yields and the loss of seedlings and planting material of the FANSER interventions.



Projected change in temperature and precipitation in Zambia by 2050 (CIAT; World Bank, 2017)

Vitamin-A rich maize is not a preference

The cultivation of vitamin-A rich maize can improve the uptake of this important micro-nutrient. Despite the relatively wide-spread knowledge on the benefits of vitamin-A enriched orange maize, its cultivation is very rare. Following experts and farmers, this was due to the lack of market access and the dietary preference for white maize (Table 25).

Table 25: Cultivation of fortified maize	
Barriers that limit the cultivation of vitamin-A rich maize	
Access to seeds	Farmers said it is becoming increasingly difficult to find seeds within the villages / the region. Some farmers said that seeds were more expensive, and prices could be twice as much as the seeds of conventional maize.
Poor market possibilities	Lack of market access and difficulties to sell the produce. A local traitor said he did not buy orange maize at all due to the lack of demand.
Cultural preferences	Constraints in using the flour, since it has little familiarity in taste and colour.
FRA prioritization	Experts said the strong prioritization of the Federal Reserve Agency (FRA) to purchase white maize discourages farmers from cultivating bio-fortified maize.
Source: Own data.	

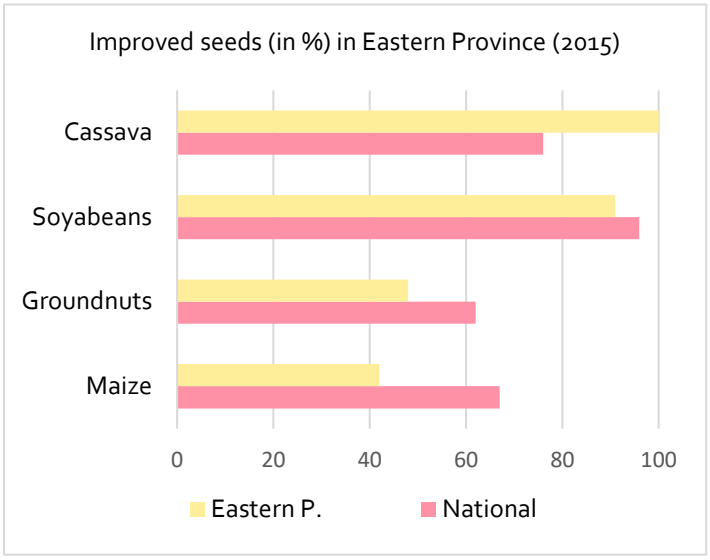
Limiting factors in crop production

In both districts', households had difficulties to achieve a sufficient and diverse food production. Many farmers lack agricultural inputs, which are beyond the means of a typical household budget[31]. Insufficient production was characterized by the following parameters:

- **Poor soil quality / soil mining:** Poor soil quality is attributed to the absence of trees and grasses, the lack of (sufficient) fertilizers, erosion and insufficient application of soil protection methods. Still, few farmers enhance soil fertility through potholing, ripping and the use leguminous trees. Organic fertilizer (as locally produced animal manure) is insufficient. Despite its popularity, chemical fertilizer is barely affordable.
- **Access to (especially improved / certified) seeds:** Most farmers have difficulty to access seeds, especially with regards to improved and certified varieties. Table 26 demonstrates that the number of improved maize and groundnut seeds used in Eastern Province were below the national average in 2015 (Chapoto et al., 2015).

[31] Households reported to spend main portions of their financial resources on (additional) food items, agricultural inputs, household items, education, health, transport and church donations.

Table 26: Households using improved seeds



Source: Chapoto et al., 2015.

- **Mainstreaming of maize**: Maize dominates crop production (see also p. 21) and the initiative to grow other and traditional varieties (pigeon pea, bambara nuts, millet, velvet beans, sorghum and lentils) are rare. Only few older farmers in the project region grow a higher diversity of crops. While valuing the consumption of these crops, they emphasized that marketing was difficult.
- **Storage and preservation:** Traditional storage practices (Figure 6) of any surplus can lead to post-harvest losses of up to 40 % (Interview WFP). Two storage methods were typically used for the region's main staple crops (maize and groundnuts). Individual and household storage was predominant. Community storage facilities were rare (1 out of twelve) and not popular, as communities fear theft. Only few communities stock and provide crops for community emergencies.
- **Diseases and pests:** Insects (i.e. the fall armyworm) can affect entire villages. Groundnuts, pumpkins and okra are frequent targets. Farmers have difficulties to access pesticides and have only little knowledge on their application. Only few farmers use cultivation strategies to break cycles of pest and diseases, e.g. rotation systems and traditional resistant varieties.
- **External shocks:** In the last years, farmers experienced harvest losses due to extreme weather events such as draughts and erratic rainfall or floods (Box

8). Measures and inputs (i.e. improved seeds, early warning systems, and diversification) to prevent these losses are not available or poorly implemented.

Unshelled maize and groundnuts are stored in small sheds made of mud and straw (see photo 1). Shelled maize and groundnuts are stored in bags or traditional baskets. To protect the crops from rodents and insects, a few households add **pesticides**.

Figure 6: Typical storage for maize (left) and groundnuts (right) in Katete district

Source: Own data.

Limitations in access to arable land

Nearly all households in both districts have access to arable land[32]. However, and in spite of the relatively low population density, some farmers reported that they have difficulties to achieve a sufficient production quantity as they have limited access to additionally required arable land plots (new fields are distant, or not eligible to rent / buy) (Table 27). Farmers reported that the average **field size** is around 1-2 acres, which underlines the difficulties to produce sufficient amounts.

[32] At the community level, local headmen oversee land distribution. Farmers desiring arable land must ask permission from local authorities. New families can buy land or will sometimes receive it as a gift from the headmen

Table 27: Shortage of arable land	
Limitations in access and availability to arable land	
Geography	In Kanjala/Katete, arable land is limited as a result of the rocky landscape.
Heritage	Inheritance of land follows patrilineal lines. By law, "*women and men have equal opportunity" to inherit land (Headman of Kanjala).* In reality, however, men have more opportunities, since female siblings *are "more likely to get married and relocate to their husband's place"*. This may result in limited land ownership for women"[33], which is detrimental for widows and single mothers.
Population growth	In various villages, rapid population growth was a key driver of decreasing accessibility of suitable and proximate land.
Source: Own data.	

Limited access to public agricultural inputs

The Ministry of Agriculture initiated the **Federal Farmer Input Subsidy Programme** (FISP) to improve rural household's access to farm inputs by providing e-vouchers. Farmers can use these vouchers to buy cashless agricultural inputs at local "agro-dealers". Still, some households reported not to have access to the programme, and those who have access often face long waits before the government loads money onto their e-voucher cards. Others mentioned that the inputs are disproportionately allocated to wealthier households. As a result, e-vouchers became less attractive, and farmers returned to buying directly from village cooperatives. To be eligible to the programme, farmers need to have a min of 0.5 ha of arable land, be a member of a cooperative and possess enough financial resources. According to IAPRI, targeting of beneficiaries in rural areas needs to improve (Chapoto et al., 2017). Other experts mentioned that the programme has limitations due to side-selling, insufficient quality of fertilizers, and insufficient trainings and extension services.

Cultivation patterns to increase production

Farmers were trained on conservation farming by lead farmers as part of the **FANSER interventions**. Conservation farming[34] can increase yields, strengthen

[33] Women usually acquire the right to cultivate land through marriage. Getting exclusive access to land is very difficult for unmarried women, and they can only rent land plots from other villagers.

[34] Conservation farming is also a strategy adopted by the Zambian government to increase resilience to climate change, increase soil fertility and yield (Interview KI).

water and nutrient retention in the soils, reduce seasonal workload, and increase resilience to climate change. In both districts, FANSER interventions included the diversification of crops as well as "ripping" and using "holes" for planting.[35] Furthermore, farmers adapted agro-forestry, and planted bananas and sugarcane in their gardens to retain soil moisture.

While these practices are labour intensive, interviewees mentioned that the programme interventions, which also supplied inputs, trainings and extension services, were beneficial as they helped increase yields.

Mixed cropping can be an effective cultivation method to obtain more diverse and even higher yields, depending on the location and the specific combination of crops. However, mixed crop cultures are labour intensive, not well suited for mechanization and require knowledge. **Crop rotation** is a common method in the region and allows the soils to recover. The traditional practice of **burning fields and grasslands**[36] is used to clear the fields after harvest. Due to the risk of bush fires, this practice is forbidden by the government. However, only one out of the twelve villages visited received a reprimand for agricultural burning.

Horticultural production to increase dietary diversity

Horticulture production plays an important role in the availability of micro-nutrient-rich fruits and vegetables for rural households and offers an additional income source (Wiggins and Keats, 2013). 34 % of households in the project region engage in horticultural production (Evang and Kuchenbecker, 2015). Farmers cultivate **vegetables** like rape, Chinese cabbage, pumpkins, cowpeas, sweet potatoes, okra, spinach, amaranth, green beans and tomatoes.[37] Only a few farmers reported that they cultivate **orange fleshed sweet potatoes (OFSP)**. As for fruits, farmers grow bananas, papayas, guavas and sugarcane, oranges and lemons (the latter two mostly in Katete).

Horticultural production is done in vegetable (1) and home gardens (2)

1. Most vegetables gardens are located next to rivers guaranteeing water access (often seasonal) and are managed by men. Vegetable gardens are also cultivated during off-season, when households can allocate labour

35 The "chaka hole" method conserves the soil and retains moisture for increased yields.

36 Grass is used for feeding livestock and for thatching houses. Its decreasing availability might be a motivation to improve environmental protection.

37 Cucumber, onions, spring onions, carrots, peas and mustard are also cultivated but not as popular.

force. Another advantage of off-season gardens is the fact that insect infestation is much lower during that period.

2. Home gardens (backyard gardens) within the households are rare and yield only little produce. In contrast to the vegetable gardens, they are managed by women. Women like having their own gardens and said that they possessed the necessary know-how to increase vegetable production.

Smallholder households face several challenges in horticultural production (Table 28):

Table 28: Smallholder households' challenges in horticultural production

Challenges in horticultural production	
Poor access to and low availability of water	Despite rich sources of groundwater, farmers rely on rain- or river water as they lack the technological equipment to extract groundwater. To increase availability, farmers dig small holes (water storage) or wells next to the river's streambed to access water in the dry season. The promotion of treadle pumps aims to increase vegetable production (see fig. 31).
Lack of suitable land	"Good" arable land (next to water sources) is scarce and not available to many. Often, fertile lands are far from the villages. Some gardens are 40 minutes by foot away. In Kanjala/Katete, arable land is scarce due to the rocky landscape.
Poor access to seeds	Households have poor access to seeds for horticultural production. Furthermore, they lack knowledge in recycling seeds. The FANSER seedling distribution programme (in Katete and Petauke) and the promotion of keyhole gardens (in Petauke) address this need for seeds.
Time-consuming	Horticultural production is very time-consuming. During the rainy season, women often do not have spare time to engage in gardening due to their high work- burden
Gender	Vegetable gardens are typically owned by men. Women carry the responsibility to take care of (smaller) home gardens. However, home gardens are rare. FANSER promotes keyhole gardens to the beneficiaries.
Source: Own data.	

Box 9: Interventions of FANSER

The FANSER's programme is active in different nutrition sensitive agricultural interventions (e.g. keyhole gardens, seedling packages, treadle pumps) trying to address the complexity of the issue on multiple levels.

Seedling packages contain a mix of micro-nutrient-rich crops, including rape, green beans, sweet potatoes (OFSP), tomatoes, spinach, ground nuts, soy, amaranth, papaya, orange, and lemon. The distribution programme also teaches seed-recipients on cultivation. As access to inputs is difficult, farmers appreciate the packages, and stated that the availability of vegetables for consumption has increased. However, farmers reported that the distribution did not always match their cultivation periods (in this context, increasing erratic rain patterns and droughts need to be considered) and that the quantity of seeds was too little. Also, many farmers do not know how to conserve the seeds.

Keyhole gardens are part of the intervention in Petauke district. The gardens were constructed in the backyard of selected households. They are around 1-meter-wide circular raised gardens with- an indentation in the middle that can be used for irrigation and the disposal of organic household waste. Due to their specific design, keyhole gardens require less irrigation and tolerate grey water. During the field research, the team identified challenges and "enablers" of keyhole gardens.

Challenges: Pests, animals damage, high cost of gardens (around 500 kwacha each), inadequate use of water, insufficient training, lack of space.

Enablers: Greater household vegetable production, extra income, diet diversification. Often, households did not use the keyhole for the disposal of organic kitchen waste. When asked, households reported that they did not produce enough organic waste or use the hole for the disposal of non-organic materials. In certain cases, keyhole gardens were used as storage for crops (e. g. sunflower seeds, maize cods).

The programme included the distribution of **treadle pumps** to local households in the Katete district. **Treadle pumps** are low-cost alternatives to motorized pumps and can be used for field irrigation. They are especially suitable for smaller plots of land in remote areas. These human-powered suction pumps lift water from wells, lakes and rivers. Compared to bucket irrigation they are a more efficient and simpler means of irrigation and extend the growing period of horticultural production (Kay & Brabben 2000). Beneficiaries said that the treadle pump saved time, was easy to maintain, and allowed a larger area to be irrigated. Ideally, 2–3 people share a pump to irrigate 1 ha of land. In practice, however, up to 30 farmers share a single pump, limiting the positive effects for individual households. As a best practice, farmers suggested the implementation of a "management and distribution plan" in the villages to ensure more efficient pump use. In addition, many farmers lack the financial means to maintain the pumps, and only few spare parts are available. As a response one village has organized a collective for pump- maintenance (2 ZMW/a month).

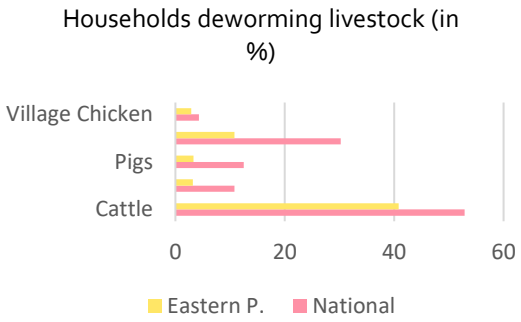
Source: Expert Interview and FGD in Katete.

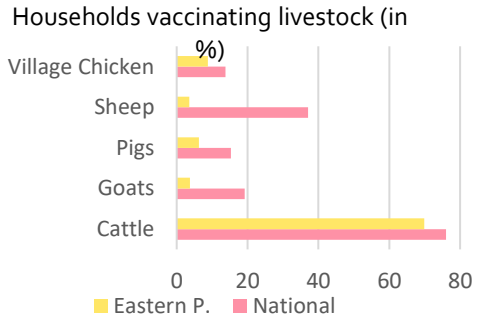
The FANSER programme implements a set of nutrition- and gender sensitive agricultural interventions to increase vegetable production in Eastern Province, including the promotion of treadle pumps, keyhole gardens and seedlings packages (Box 9).

Animal husbandry

The main type of animal husbandry in the villages is poultry farming, mainly chicken rearing. Few farmers breed guinea fowls or pigeons or have goats, and even fewer have cattle and pigs. Nowadays, only 10 % of farmers own oxen which they rent out for tillage or other activities to generate additional income.

Table 29: Percentage of households that vaccinate / deworm livestock





Source: Chapoto et al., 2015.

The **FANSER program** distributed chickens to increase the dietary diversity of the target group and to offer an additional income source. Problematically, **vaccination rates** and veterinary services in Eastern Province are low (Table 29). Farmers in Petauke district reported that they lost up to 90 % of their stocks due to an outbreak of Newcastle disease[38] (ND; Box 10: Information on Newcastle disease) Farmers in one village decided not to breed pigs due to an unknown disease which reportedly frequently breaks out during the dry season.

The full vaccination of chickens is indispensable to encourage the production of (and, subsequently, the consumption of) animal protein. Alternatively, the

[38] This can be attributed to different approaches by the implementation partners. While CARE (Katete) distributed fully vaccinated "town chickens" (ZK-B-IM2), CRS (Petauke) bought "village chickens" without vaccine protection (ZP-B-IM4).

production of less susceptible poultry species such as turkey or guinea fowl can be promoted (IICA, 2016).

Box 10: Information on Newcastle disease

Newcastle disease (ND) is one of the most widespread and dangerous poultry diseases worldwide with mortality rates up to 100 % (IICA, 2016). ND is highly infectious and has a severe impact on food security and the livelihoods of livestock farmers and communities. Today, ND most commonly occurs in rural areas (Songolo and Katongo, 2001). In the project region, ND is a reoccurring problem (Mubamba et al., 2016) and restricts rural poultry production. Mubamba et al. (2016) find that ND- outbreaks in eastern Zambia follow a seasonal and cyclic pattern, and occurrence peaks in the dry season. The estimated provincial incidence ranges between 0.16 % and 1.7 % per year. The introduction of private-sector vaccines and the expansion of extension services has reduced the occurrence of the disease (Songolo and Katongo, 2001). In 2015, the Zambian Ministry of Agriculture and Livestock has introduced vaccination schemes for village chickens in the project region (Daily Mail, 2015).

Source: Daily Mail, 2015; Mubamba et al., 2016; Songolo and Katongo, 2001.

5.2.4 Dietary diversity and health in Eastern Province

The baseline data shows that 24 % of smallholder households in Eastern Province are moderately food insecure. 13.5 % are severely food insecure (HFIES- applied in the post-harvest season). While most households (63 %) received nutrition counselling through the Health Surveillance Assistance (HAS), dietary diversity is critically low among children (45 %) (Evang and Kuchenbecker, 2015). As food and nutrition security follows periodic circles, and the baseline survey was conducted prior to the peak of the hungry season (September and October 2015), these figures need to be read with caution.

Periodic patters of food and nutrition security

The dietary intake of smallholder households in the project region strongly depends on the time of the year. During harvest period, most households have sufficient resources to sustain their diet. However, food stocks dwindle fast and soon the most vulnerable families face a period of reduced availability of various food items.

During this period, maize availability is low. At the same time, household's financial resources are often depleted. On top, market prices are at their peak and almost

double. The anti-cyclical market behaviour of farmers (farmers (have to) sell their products when prices are low) contributes to the critical state of food and nutrition security.

Meal frequency strongly depends on the season and the household's availability of food resources. During the harvest season, meal frequency is two to three times a day (i.e. lunch and dinner and porridge for breakfast[39]). During hungry season, the meal frequency of most households reduces drastically, and the caloric and micro-nutrient intake of the harvest season cannot be maintained.

During fieldwork (mid-August), the team encountered households that already reported that they did not have sufficient quantities of maize available to sustain their families. For many vulnerable and resource-poor households, the hungry season can last up to six months.

Despite the shortage of the main staple maize, various food items are available during the hungry season and (have the potential to) strengthen resilience. These food items deserve special attention (Box 11) and, if possible, their cultivation should be encouraged.

Box 11: Available food items during the hungry season

Available food items during the hungry season

Fruits: Mangoes, guavas and bananas.

Animal protein: Mice and insects.

Vegetables: Sope, tindingoma, nakatate, wild amaranth, okra, lumanda and a wild starchy root called mpama (misepo)

Cultivated crops: Groundnuts, pumpkins, sweet potatoes and cassava

Source: Own data.

Figure 7 depicts the annual cycle of harvest, climate and food availability in the project region. Between December and February, the shortage of maize is at its peak. In March, households experience relief as the harvest begins and fresh maize and pumpkins are available. Most families reported that maize availability is high

[39] Porridge (made from maize or soy flour) is mainly consumed by children for breakfast.

till the end of July. However, stocks deplete fast and maize shortage reoccurs in October.

Figure 7: Hungry season and maize production (Nyotyngo/Petauke)

Source: Own data.

During the hungry season, families often lack the financial resources to purchase additional food items. According to an expert from "Innovations for Poverty Action" (IPA), small loans provided an effective mechanism to increase households' resilience during the hungry season and enabled them to invest in business-activities. Villages in both districts have introduced **self-managed banking systems** that offer microcredits to help households cope with financial shortages during the hungry season. Providing access to small loans can increase well-being and agricultural output and can decrease the likelihood of households running out of food.

Households and individuals have developed various strategies (Table 30) to cope with food shortages. While these strategies may ameliorate the current situation, they often worsen the vicious circle of increasing poverty and severe and acute

malnutrition. Food aid programmes are not common and difficult to access for geographically isolated households. Women and children in resource-poor households are particularly affected by the reduction in quantity and quality of food intake. Some mothers are forced into periodic migration to nearby Mozambique to generate income.

Table 30: Coping strategies during the hungry season	
Coping and resilience strategies during the hungry season	
Consumption of wild products	NTFPs are an important food source during the hungry season. For information on their availability see fig 27[40].
Reduction of dietary diversity	Households eat *nshima* only (rarely combined with beans and green leafy vegetable such as cabbage and rape)
Reducing food consumption	Individuals eat only one meal per day (mostly lunch) to economize food stocks.
Changing of eating habits	Especially children are fed (and eat) more fruits, insects and mice (men eat fruits when maize gets rare). People also consume unripe bananas or mangoes. Cassava is a fall-back option in the run-up to the harvest during the "hungry season".
Additional income generation	In order to cope with shortages in money and food, individuals work on other people's fields (weeding) or do off-farm work in exchange for money or food (such as mielie meal). Another strategy for income generation is (periodic) migration. Following farmers, Mozambique was the main emigration destination.
Food aid	Government or hospitals also provide food during the hungry season.
Source: Own data.	

Dietary intake in Eastern Province

The diet in the project region is based on maize. The maize is processed into flour, and the flour is used to prepare "nshima" (Box 12), the most popular food in the

[40] Surveyed households reported that wild amaranth was common though not popular. Okra is commonly found in the wild. Mangoes are an important product and "eaten when times are hard", especially in the beginning of the hungry season. Mpama/misepo roots are similar to sweet potatoes and cassava but they are increasingly difficult to find. Furthermore, they have a growing period of five years, lie deep in the ground, must be harvested between November and December and need to be boiled several times before they are edible.

project region (Box 13). Most households rarely consume nshima with meat on the side. Often, they eat green leafy vegetables (i. e. spinach, rape, pumpkin, sweet potatoes and pumpkin leaves and amaranth) as a side-dish, often topped with groundnuts. Other consumed vegetables include tomato, okra, pumpkin fruits, and Chinese cabbage.

Box 12: Nshima

Nshima is a flour porridge made out of maize powder that is processed into a pulp. It is the most popular food in the project region and the main caloric source of most households. As one woman explained, "Nshima is the most important thing for me, without Nshima there is no life." Even though nshima contains necessary carbohydrates, it is poor in micro-nutrients, and should be accompanied by micro-nutrient rich sides.

Source: Household interviews in Petauke, Katete.

Box 13: Nshima is served with relish and meat.

Source: Private.

An expert stated that while the majority of the target group still consumes an **unbalanced diet**, dietary diversity is slowly improving. Similarly, a doctor from Petauke said that while the figures on stunting were still alarming, the nutrition situation in Eastern Province has improved over the years. This was confirmed by participants during a focus group discussion, in which a group of mothers described the value and various health-benefits of local foods. The mothers noted that a more diverse diet improved their children's health. Women in project villages often enrich

nshima with pounded pumpkin leaves, groundnuts or sugar. The mothers reported that their children (regardless of age) tolerated these new recipes.

To increase vegetable[41] consumption, households gather **wild plants** in the forests or from non-cultivated (fallow) land (see also section on wild food items, p. 71). The main vegetable **protein source** is beans (however barely processed). The **consumption of eggs** depends on whether a household raises its own chickens or not. The FANSER interventions increased households' awareness of the health benefits of egg consumption for their children. A farmer said he made sure that his children ate eggs at least once every three days. Women rearing chicken consume eggs more frequently, while households without chickens rarely consume eggs.

Apart from eggs, the main animal **protein sources** are chicken, small fish (kapenta; see Box 14), pigeons, and wild animals (i.e. mice, insects, various wild birds). Consumption of goat meat and beef was considerably low.

Box 14: Kapenta

Kapenta refers to several small fish species (e.g. *Engraulicypris Engraulicyprisardella*, Strothrissa tanganicae, *Limnothrissa miodon)* that are very popular in the project region. Often, kapenta is the only fish that rural communities consume. "Dried kapenta" is the most purchased fish product for food insecure groups. The most likely reason is that they can be purchased in smaller and more affordable quantities than larger tilapia. Kapenta is also used in exchange for meat.

Source: Kaminski, 2018.

The overall meat consumption was very low, especially among women and children, as they only receive a small portion when a household can afford to serve meat.

The consumption of **dairy products** is also low and confined to milk, which is exclusively obtained from cows. The goats in the villages are not milked, due to cultural norms. Alongside with sugar, meat and soybeans, milk is considered a luxury product and most households cannot afford it. **Rice** (when affordable) and **orange flesh sweet potatoes** (between May and July) are occasionally served for

[41] Most individuals in the villages trade agricultural products. Other interviewees stated that they have to buy spinach, rape and cabbage because they do not have their own gardens.

breakfast. Other common (seasonal) dishes include pumpkins, groundnuts, rape and potatoes.

A variety of **fruits** are part of the diet. While guavas, watermelons and sugar cane[42] are seasonal, fruits like papaya, oranges and bananas are available throughout the year. Mango is available in abundance during the rainy season (Jan/Feb), but not processed any further. Children consume fruits more regularly than adults and eat them throughout the day, if available. Wild[43] fruits are not popular among men and rarely consumed. Men said that except for bananas, fruits were not filling enough. In order to increase households' fruit consumption, the interventions need to address this issue, and focus particularly on men.

Wild products as an essential part of the diet

Despite decreasing availability due to soil degradation, wild food items (see Box 15) supplement the everyday household diet in Eastern Province and are an important source of micro-nutrients (Mofya-Mukuka, 2015). Many respondents praised wild foods for their taste, diversity, nutritional content and medical value[44]. Some of them are available during the hungry season and strengthen resilience (see p. 65). Wild **mushrooms** (e.g. *Chanterelle spp.*, *Termitomyces spp.*) are consumed as a relish with tomatoes, onions or pounded groundnuts between November and March. In one village in Petauke district, women preserve wild vegetables collected after the rainy season (*mliuli, makole, mfimfia, ngaingai*). However, preservation of wild foods is not common, despite its potential to increase food and nutrition security.

[42] Watermelon is consumed as a snack rather than prepared in dishes.

[43] A wide range of wild fruits are eaten. Children mentioned to like masuku, masau, ngaingai, nkondokondo, nga nchembele, msekese, viyulu, maganda, nchembele, mpovia and vigome.

[44] Additional wild foods that households forest include babas, gandanjembere, sope, tindingoma, nakatate, wild amaranth, lumanda, mlosi, njole, kasilantwiro, kombwe and chiwomba.

Box 15: Information on wild foods in the region. Seasonal calendar for wild foods

Wild procucts	J	F	M	A	M	J	J	A	S	O	N	D	Wild procucts	J	F	M	A	M	J	J	A	S	O	N	D
Acenze (insect)										■			Mulozi	■	■								■	■	■
Bowa	■	■	■								■	■	Mupovya		■	■									
Chiompa										■	■	■	Ngayengaye	■	■	■									
Inswa (termites)											■	■	Njolole	■	■								■	■	■
Kasilantwiao										■	■	■	Nthengele (fruit)											■	■
Kombwe										■	■	■	Nthowa (caterpillar)										■	■	
Mango										■	■	■	Sope	■	■	■						■	■	■	■
Mpama	■	■								■	■	■	Ucha (honey)						■	■					

The annual availability of selected wild products shows that the rainy season is particularly abundant (especially in vegetables).

Wild animals and insects are popular foods, especially among children. Non-livestock rich animal protein sources such as wild fish and wild animals such as mice, birds, bats, locusts are widely consumed in the region and play an important role in the diet of the target group. Mopane worms, grasshoppers and other insects (e.g. *achenze*, *insua* and *ntowa)* are additional sources of animal protein, especially in the rainy season. Insects from markets are barely affordable for many households. They are nevertheless cherished. As one woman told us, "I just love caterpillars because its healthy for the body and my children also like to eat them".

Source: Focus group discussion in Petauke.

Children are the main collectors of wild foods. In some locations, wild predators (hyenas) pose a threat to humans, restricting the collection of wild foods and insects. Many interviewees expressed their concerns about the **decreasing availability** of regional wild food items. Following famers, experts and key-informants, deforestation[45] and environmental degradation were the main reasons. According to SNV (Netherlands development agency), agro-forestry programmes that promote both forest protection and commercial use of wild products have the potential to mitigate degradation and increase farmers' income (SNV – Expert interview).

[45] Between 1990 and 2000, Zambia lost about 851, 000 ha of forest, noticeably reducing biodiversity and access to wild foods (Mofya-Mukuka, 2015).

Food preparation and preservation

Women are responsible for food preparation[46] and invest huge amounts of time in household- activities associated with food preparation (i.e. cooking, preparation, cleaning, gathering firewood, getting water; see p. 49). Women said that they spent a lot of time gathering firewood when firewood in their immediate surroundings becomes scarce. In rural Eastern Province, only few households can afford to buy **charcoal**. Due to their relatively high costs, the use of resource-efficient stoves is marginal.

Households use **different preservation methods** for vegetables. Most households not only preserve green leafy vegetables but also insects and beans. Green leafy vegetables are commonly blanched (vegetables are put in a plastic sack in boiling water), sun-dried, and stored in tree leaves and buckets. Some women process soybeans and cow peas into *sausages* and thereby generate little income. Mango and cassava are not preserved, even though that could increase their availability throughout the year. Sweet potatoes (OFSP) are difficult to preserve and process. Households often do not have adequate packaging materials to store preserved food items and use ordinary plastic bags or wrappings instead. As a result, the items frequently rot, and lead to foodborne disease if consumed.

Diet during pregnancy

Most women are aware that a diverse diet is essential during pregnancy, and do not follow traditional food taboos[47]. A headman in Katete emphasized the importance of discouraging people from clinging to old beliefs.

Diverse food consumption during pregnancy is highly influenced by a household's **financial resources**. However, nutrition counselling and other interventions had a positive effect. Awareness on the importance of care, proper feeding and a balanced diet is better and more solid in villages with active programme interventions. One woman stated that she stopped buying eggs for herself after giving birth due to a lack of money but buys fresh fruits oranges and bananas instead to improve her micro-nutrient intake.

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[46] Only few men said to occasionally prepare eggs, meat or small fish.

[47] Only a few women reported to follow traditional food taboos during pregnancy. These include the belief that the consumption of eggs results in bald children, that barbel fish can cause epilepsy, that eating mice causes difficulties giving birth, that okra lacks nutrients and that sugar cane and fresh ground nuts can cause skin irritation in the infant.

Many women know of the importance of breastfeeding during a baby's first six months. In most households, infants received food in addition to breast milk. In beneficiary villages, mothers enriched the diets of infants (Box 16) to increase their uptake of micro-nutrients.

Box 16: Enriched diets for infants

One woman in the project region stated that young infants commonly receive porridge with pounded groundnuts, salt and sugar. When asked about the texture of the porridge, most women said that it should be thick. Mothers learned from FANSER how to enrich porridge with pounded kapenta and green leafy vegetables. Another mother said that she fed her second child differently from her first one because of the training she received from NVs. Infants are also given nshima and sweet potatoes with relish (or meat). As one mother explained, "It helps the baby to grow healthy because of the vitamins."

Source: Own data.

Impact of the FANSER interventions

Beneficiaries in both districts reported improvement in their overall **nutrition situation**. Women eat a more balanced diet, use new preparation techniques, and adopt proper feeding practices for children. A headman explained that the nutrition-sensitive agricultural interventions have made more vegetables available for consumption in his community. Another respondent said that interventions encouraged him to invest in a more diverse diet. With the money from selling his crops he started buying additional food items for his family. Beneficiaries also attributed a positive effect of the **FANSER interventions** on some men's nutritional knowledge. Men admitted understanding the importance of a diverse diet for pregnant women better now than before the programme began. Still, **men's active participation** is rare, and women often find themselves in the difficult situation of trying to introduce recipes while lacking money to buy the foods needed to make them. Several women mentioned, increased participation of men would improve household's nutritional status.

Nutrition education and knowledge transfer

Nutrition education is passed through various channels. Table 31 summarizes nutritional knowledge sources as stated by the target group. In their impact on nutrition, the role of grandmothers and other caregivers is ambivalent. In

beneficiary villages, women describe cooking demonstrations as an important source of nutrition and health information.

Table 31: Nutrition education in Eastern Province

Nutrition education and knowledge transfer in Eastern Province	
Grandmothers and (other) mothers	Grandmothers and other mothers play an important role as sources for information on breastfeeding and childcare, especially in locations where health workers are not present or active. These auxiliary caregivers help in the household (especially when the mother is working or unable to provide needed care for the child) and give advice. However, care afforded by grandmothers can also have negative effects. Experts said that grandmothers often stick to traditional ways of cooking since they did not receive any training in nutrition. In addition, their care could encourage parents to be less involved in child-care.
Neighbours	Nutrition information among women is shared through by sharing recipes and making observations. Traditional recipes are passed from mothers to daughters.
Local churches	Local churches provide health and nutrition information on a wealth of topics: food preparation, health during pregnancy, non-communicable diseases, illness prevention, breastfeeding and complementary feeding, food handling, the care of underweight children, childcare practices, and the nutritional value of groundnuts, meat, milk, moringa and vegetables for children. The church in Katete is part of the DNCC and organises women groups and a meeting every Sunday to discuss important community issues on health, gender and nutrition.
Cooking demonstrations	Cooking demonstrations are an appreciated source of information on nutrition (and health) in beneficiary villages. The topics of the training programmes are similar in both districts. An NV stated that the most effective results are seen in hygiene, postnatal care exclusive breastfeeding, and gardening.

Source: Own data.

Food and nutrition education is part of the syllabus in Eastern Province. In an economics class in the first and third year, pupils learn about health, hygiene and nutrition. Following a primary school teacher, the classes on food groups, meal frequency, handwashing, germs and other topics were successful, but concrete actions such as school gardens were needed. The teacher described a 2–3-month pilot meal project offered by the World Food Programme (WFP) to increase micro-

nutrient intake and encourage school attendance. The programme provided free dishes to the school children (i.e. "sampo", a dish made of maize and groundnuts, salt, sugar and cooking oil or cow peas). However, the interviewee did not notice a difference in school attendance. The **school meal programmes** in both districts tend to be erratic. School feeding is irregular, and more common in primary school.

Financial resources limiting adaption of recipes

The **FANSER interventions also teach recipes** to help improve the every-day diet of the target group. While beneficiaries value the effort, they find it difficult to follow the recipes either because the ingredients are unavailable (for instance due to crop failure) or unaffordable (such as kapenta and eggs). As a result, households often end up eating what is available. One NV described the difficulties to afford additional food items such as sugar, fish, fruits, meat, milk or soybeans: "Knowledge of dissemination is good but what they are really lacking are the means to eat healthy." One mother (non-beneficiary) finds it hard to find the means to follow nutrition advice from schools, doctors and cookbooks as "ingredients for diverse foods are very expensive". However, households with extra / regular income such as owner of village shops reported being able to afford additional food items to diversify their dietary intake. Following a school director, households with sufficient income like to add fish or meat to their diet (see also Box 17).

Box 17: Increased consumption of processed food

Consumption of processed food

Many families reported an increase in consumption of processed food such as poultry products, chips and sugary drinks. According to one doctor, this can result in higher risk of non-communicable diseases (NCD) such as diabetes and high blood pressure. Community programmes and awareness-raising for NCDs already exist in Katete district, as one government health worker reported. Women stated that processed food is increasingly available nowadays. A variety of food is perceived as "English food" – part of the global transformation of how people eat.

Source: Own data.

5.2.5 Access to health services

In Zambia, health services are free of charge and national government and local authorities encourage the use of health facilities (Box 18: Authority and health).

Still, communities' **access to health centres** is difficult. Health facilities can be located up to 15 km away from villages (as in the case of Chambwe and Nyatondo), and the walking distances range between two and three hours. Only one (out of 12) of the villages visited (Jacob II) has its own health station.

Box 18: Authority and health

In Kanjala (Katete), women must pay a penalty of 50 Zambian kwacha when they do not give birth in the hospital. Unfortunately, many give birth *on the way* to the hospital and often suffer from birth complications. In Chambwe (Petauke), a local chief imposes penalties when women give birth at home or on the road.

Source: Own data.

Health status in Eastern Province

Diseases decrease an individual's capacity to work on the fields, to care for the family, and/or to generate an income, and, due to the lack of social protection and adequate healthcare, also affect the well-being of the entire household. Household members attributed the communities' poor health status and the high prevalence of diarrhoea to contaminated water sources (stream water, well contamination), unbalanced diets and lack of sanitation. However, women said that the FANSER interventions and trainings have helped reduce the prevalence of **diarrhoea**.

HIV / Aids prevalence is also decreasing but still high (10.3 %; CSO 2015), and the lack of adequate care of affected families turned many children into orphans struggling to achieve food and nutrition security.

Other diseases mentioned were parasites (such as worms), diabetes and anaemia. A doctor from Petauke stated that malaria poses a challenge, too, and particularly affects undernourished children. FANSER has recommended that households dig rubbish pits ten meters away from their homes to prevent disease transmission,

Early motherhood as an additional determinant

Early pregnancies are prevalent. Following schoolteachers and other authorities, schoolgirls who become pregnant were very likely to drop out of school. According to an official at a secondary school, the main reasons for early pregnancy were early marriage and lack of education. During annual meetings with the community, the school staff tries to inform about the consequences of early pregnancies. However, these efforts are largely vain as prominent socio- cultural norms do not promote

the education of girls. Furthermore, unemployment rates are high and appear to discourage parents to invest in their children's education, especially at the secondary level when school fees apply. While family planning materials are for free, they are often not available (Box 19).

Box 19: Family planning in Katete

Family planning material is free but not always available. Lack of knowledge on contraception and socio-cultural norms appear to be common barriers to family planning. In Kanjala, for example, several people mentioned that family planning is looked down upon as it is believed that girls using contraception were not able to conceive and behaved more promiscuously.

Source: Own data.

Childcare in care facilities

Basic medication and treatment at the health facilities is mostly free, though many children and women have difficulties to reach the centres. The infant mortality rate in Eastern Province is 82 deaths per 1,000 live births (ZDHS, 2007). Women do not always attend the recommended number of pre- and postnatal care visits. However, older women in the Katete district reported that child delivery services have improved over the years, decreasing mortality rates during childbirth. In one village, a headman described the positive effects of increased accessibility of health centres: ever since a new centre opened in his village, most women have given birth at the clinic and the community has learned about health and WASH relevant topics.

In the project region, access to sanitation is comparatively high as former community leaders and development agencies (i.e. USAID) supported the construction of sanitation facilities. Figures show that sanitation access in rural Zambia (36 %) is above the average in sub-Sahara Africa (Unicef, 2016b). However, villages that did not receive support in the past lack sanitation facilities.

5.2.6 Information channels in Eastern Province

Besides income, gender, and agricultural production, access to information and communication are key factors influencing food and nutrition security (see 5.1. quantitative results). Therefore, one approach to promote food and nutrition security of rural communities is the development of communication strategies that

trigger social and behavioural change (3.3). These strategies include interpersonal communication, social change and community mobilization activities, mass media campaigns, and advocacy work.

Access to information in Eastern Province

Table 32 presents an overview of the different information channels that influence the target group's decision- making processes on nutrition, agricultural production and care practices.

Table 32: Communication channels based on the National Food and Nutrition Commission of Zambia 2017

Information channel	Description
Interpersonal communication (i.e. extension services)	One-on-one client centred counselling, group education and on-going support and coaching by community-based groups (e.g. peer counsellors, community-level promoters, farmers, extension and health workers and facility-based health workers). Aim is to reach mothers or direct caregivers through multiple points of contact by delivering nutrition-specific services and interventions.
Multiple media channels	Mass media, community radio or video, local media (e.g. posters, flyers, calendars), traditional methods (e.g. songs, dance) and social media and mobile phones (e.g. SMS).
Community mobilization and advocacy	National campaigns (Immunization Days, Child Health Days, World Breastfeeding Week, Water Days), field shows or displays, food fairs, rallies and events on national, provincial, district and community levels. Aim is to educate and motivate influential audiences so they will pass on the message and support maternal, infant and young child nutrition.

Source: National Food and Nutrition Commission of Zambia, 2017.

Extension services as interpersonal communication

FANSER integrates an information-focused model to target households through governmental volunteer structures (Burrows et al., 2017). As the regression analysis shows, interpersonal nutrition counselling is positively associated with nutrition outcomes of the target group.

To tackle the multidimensional problem of malnutrition, stringent coordination between ministries and across sectors is essential. The National Food and Nutrition Commission (NFNC) is the driving force behind the MCDP and helps address the underlying causes of malnutrition, largely through coordinated and decentralised action at the national, provincial, district and communal level. At the district level, the DNCC allows ministries (agriculture, livestock, health and community development), representatives from maternal and infant health, and civil society to align their nutrition interventions through robust planning and coordination. FANSER supports the DNCC with community-based approaches, community mobilisation, integrated infant and young child nutrition (IYCN). At the community level, Ward Nutrition Coordination Committees (WNCCs) facilitate coordination (Global Hunger Index). The DNCC oversees the WNCC and both follow the multisector approach of the FMCDP A key element of FANSER is to establish coordination between ministries in Petauke and Katete district. This approach is known as horizontal integration. FANSER also aims to improve the vertical integration between the NFNC and DNCC (Global Hunger Index, 2019).

In both target districts, the approaches of FANSER to reach the target group differed. In **Katete district,** Care International (CI) works within governmental structures and provides trainings for a range of volunteers (Box 20).

In **Petauke,** CRS (Catholic Relief Service) applies the Care-Group approach (see Figure 8) to multiply its messages. Within the cascade-system, supervisors by CRS train health promotors that are responsible for monthly trainings of their Care Groups. Each Care Group consists of 10 Care Group volunteers, i.e. Nutrition Volunteers (NVs). The NVs are responsible for the monitoring of the neighbour groups that consists of approximately 10 households.

Box 20: Governmental volunteer system in Katete district

FANSER in Katete uses governmental extension structures to deliver its nutrition-sensitive interventions. The services are carried out by the following community workers. (For a detailed description of extension structures and models in Zambia see Burrows et al., 2017.):

Lead Farmers facilitate messages through farmer-to-farmer communication and provide trainings to pass on new agricultural practices.

Community Livestock Assistants (CLA) cater to livestock related issues and bridge the gap between veterinary officers and communities. They assist in advising on complimentary feeding and care-giving practices.

Growth Monitoring Promoters (GMP) monitor children's health and nutritional status. GMPs run a health programme that informs individuals about the consequences of malnourishment. Children are weighed monthly and mothers are made aware that they can bring their child to be weighed each month.

Community Health Workers (CHW) offer a range of services such as health promotion, screening, diagnosis and treatment. They also collect basic health information materials for locals.

Source: Burrows et al., 2017; own data.

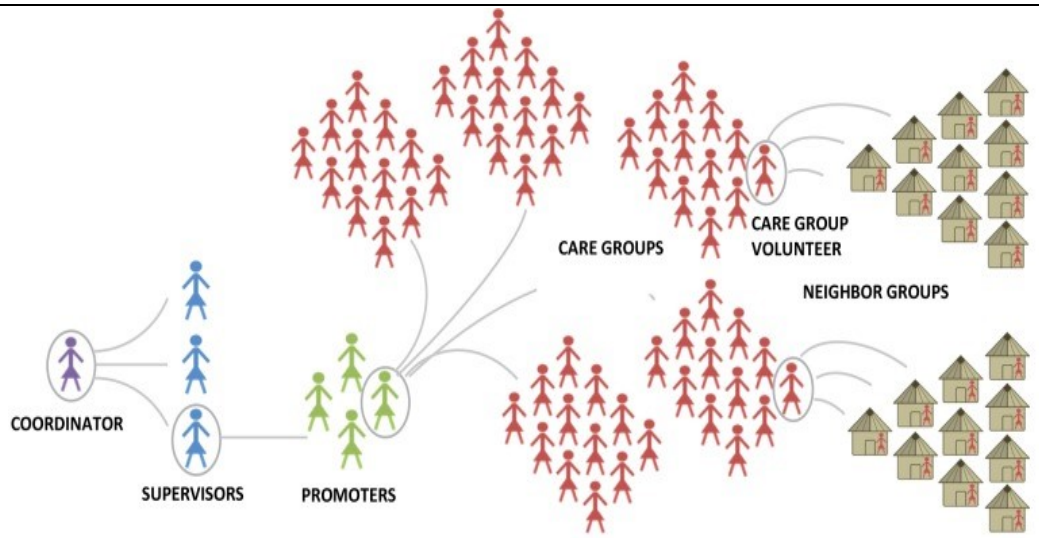


Figure 8: Care-Group Approach.

Source: Adopted from Perry et al., 2015.

Many beneficiaries explained that **lead farmers** and **volunteers** were their main contact to access extension services. In many villages, FANSER-affiliated individuals have high influence within the community (for details, see Table 35). In contrast, women in non-beneficiary villages reported that extension services were irregular and provided assistance at inconvenient times. In one remote beneficiary village, individuals did not have contact to FANSER volunteers.

Suitable media channels in addressing Food and nutrition security

In Zambia, 42,5 % of rural households own a radio (Table 33), making it the easiest way to disseminate information to rural populations. According to an COMACO officer, the **Zambian Ministry of Agriculture** uses radio to inform on agricultural related topics since 1995[48]. Exposure to campaign information by COMACO´s Farm Talk radio programme (Box 21) is beneficial, and smallholder farmers often try to implement the agricultural techniques described in the radio show (Young et al., 2016).

Table 33: Mobile device ownership in Zambia

Access to and usage of mass media by households in Zambia in % (2015)	Rural	Urban
Ownership of a radio by region	42.5	48.3
Ownership of mobile phone by region	50.4	84.8
Active users of mobile phones by region	38.8	68.3
Ownership of smartphones among mobile phone owners by region	6.5	18.4
Internet usage rural by region	3.2	16.8

Source: Zambia Information and Communications Technology Authority, 2015.

Most beneficiaries (but also non- beneficiaries) value the **DNCC** broadcasts radio programmes (Box 21) that cover topics on agriculture and nutrition. Young et al. emphasise the important interaction between radio show, extension workers, farmer-to-farmer communication, and mass media. Hence, despite limited ownership of radio in rural households, radio offers a foundation for dialogue on

[48] Radio officer from PASME Radio in Petauke: "Women are more vulnerable and seek for information to improve their livelihoods".

agriculture and nutrition-sensitive topics and increases social diffusion of sustainable innovations in remote regions (Young et al., 2016).

Box 21: Information on the activities of the DNCC and COMACO

DNCC treats radio programmes as the "better and cheaper ways of [teaching] farming". Their shows cover topics such as organic farming, weeding, using basins, rotation of crops, farming economics and nutrition advice. Information can be creatively adapted into a range of broadcast forms e.g. radio dramas, expert interviews and recordings of conversations between farmers and extension services. The **DNCC** collaborates with PASME and Radio Explorer in Petauke to broadcast radio dramas that cover topics on nutrition and health. The coverage reaches beyond Petauke and into Katete. PASME advises locals on nutritional issues and keeps everyone informed about upcoming field days. Many households - in beneficiary and non-beneficiary villages - reported to listen to the programs in local languages like Nsenga.

Community Markets for Conservation (COMACO), a Zambian-registered non-profit, produces the Farm Talk Radio Show. The show is broadcast in Nyanja across four stations in the Eastern Province and has 200,000 listeners. The programme is based on the FAO (1995) Participatory Rural Communication Appraisal (PRCA). It provides information on conservation techniques for smallholder farmers. Each episode lasts 60 minutes and is broadcast three times a week.

Source: Own data.

Mobile phones create access to required services, from providing market and price information to knowledge sharing, or monitoring children's nutrition status (CTA). The **Internet** is said to deliver a set of social (communication, information, education) and economic (new opportunities, save time and money) benefits. According to ZICTA, 83.9 % of rural Zambia has mobile network (ZICTA, 2015). However, in 2015, only 6.5 % of the individuals in rural areas that owned a mobile phone had a smartphone. Apparently, this is still the case today: few farmers reported to own a smart phone and to use social media channels. However, this might change in the future: over 70 % of the internet users are 35 years old or younger (ZICTA, 2015). Yet, farmers in both districts described various **barriers** inhibiting mobile phone use and ownership (Table 34).

Table 34: Barriers in usage of mobile phones	
Barriers in usage of mobile phones	
Infrastructure	Most villages are not connected to electricity. However, some have solar charging panels. Network coverage varies strongly; especially remote villages are without coverage.
Financial resources	Relatively high costs to buy a mobile phone and phone credit.
Gender	Women are lacking control over financial resources and cannot afford a mobile phone.
Source: Own data.	

Community mobilization and advocacy influencers as change agents

The **DNCC** Petauke seeks to educate smallholder farmers via community mobilization and advocacy. FANSER sponsors the DNCC to travel around different regions to display a series of educational **road shows**. In 2018, the DNCC managed to reach 8 out of 14 wards. They show educational performances and dance sketches covering different topics: first 1000 most critical days, food, complimentary feeding and child feeding practices, and WASH. **Farmer Field Days** offer the opportunity to introduce new agricultural practices to farmers because "[they] need to see the benefits to adapt new methods", as an officer from PASME-Radio emphasized.

For SBCC strategies to be effective, **local influencers** (i.e. change agents) are key as they help locals adopt new behaviours and maintain them over time. In the communities visited, potential influencers are either legislating authorities e.g. village headman and chiefs, or people with a high social status e.g. health worker, nurses, teachers, religious leaders or, since recently, FANSER agents (see table 15; CHWs, NVs, Lead Farmer). Table 35 shows the ranking of influencers according to levels of influence in Petauke and Katete.

Table 35: Ranking of influencers according to levels of influence		
Influence of persons and channels in the communities		
Interpersonal communication	**Media channels**	**Community mobilization and advocacy**
CHW, GMPs and nurses	Posters, flyers	Chiefs and Headmen
Lead Farmer	Plays, Community theatre	Road shows
Care Groups (NVs)	Audio-visuals (videos, songs, dances)	Farmer field days
Teacher	Radio	
Pastor	Mobile phones (SMS)	
Facility health workers (i.e. nurse)	Smart phones	
CLA		
Source: Own illustration based on interviews and FGDs. Green=high influence; yellow=modest influence; red=low influence		

All interviewees and experts agreed that **local authorities** enjoy the highest level of influence on community and household decisions. The village chiefs and headmen have the power to implement local guidelines, rules and laws. Hence, a promising strategy of the DNCC is to involve village headmen in the program. For instance, a village headman encouraged the villagers to continuously adopt and implement FANSER- practices even when FANSER withdraws from the community. This message is important to ensure the sustainability of the intervention.

Although **teachers** are not directly in contact with the target group, they are considered influential on children's nutrition and health.

The volunteer structures appear to be rather unsustainable. **FANSER volunteers** indicated that they lacked an **incentive** to stay committed to the cause. The volunteers feel that expectations of FANSER were unclear. In addition, they perceive the current mode of compensation as inadequate (volunteers are compensated with bicycles and workshops). As they have only limited time available and carry responsibilities for their own families, they expect (better) compensation for their commitment.

6 Food and nutrition security in Togo

This chapter discusses the research findings of the project region in Togo. It starts with the presentation of the results of the quantitative analysis, and subsequently examines the findings of the qualitative research. For a detailed introduction, see the relevant sections of chapter 5 (p.41).

6.1 Quantitative findings for Togo

A typical household in the project region

In the Maritime region, **the average household** (n=440; table A, p.183) (comprising all households, better-off and undernourished) has 5.7 members and is headed by a male (96 %). 67 % of the adults in this household live in a monogamous relationship. The average mother is 30 years old and went to school for 2.4 years. Statistically, she is likely to receive counselling on childcare (70 %) and nutrition (65 %). The average household has access to land (92 %), and 21 % engage in horticultural production. The sources of income generation are diverse and include the marketing of crops (78 %), the sale of l livestock (56 %) and other business activities (60 %), such as petty trade. Occasional labour (22 %) and remittances (22 %) only play a minor role. The average household lacks access to adequate drinking water sources (78 %), probably contributing to the fact that 48 % of the children suffered from diarrhoea in the two weeks prior to the survey.

In contrast, the multiple regression analysis reveals that the **typical undernourished household** is larger than the average household. The results indicate that the mother's education has a slightly positive effect on dietary diversity. Various indicators stress the positive effect of financial resources and (additional) income sources on food and nutrition security. Income from crops improves the indicators MAD and HFIES, and income from remittances and sale of livestock increase the likeliness to improve indicators MAD and WMDD.

Interrelations between food and nutrition security indicators

As in Zambia, the three indicators of undernourishment (MAD, WMDD, and HFIES) are interrelated (see Table "Undernourished HH Togo", p. 185) and stress the multidimensionality of food and nutrition security. Mothers eating a diverse diet are more likely to have children who meet the MAD intake; Mothers who do not meet the Minimum Dietary Diversity Score (WMDD) are significantly more likely to have children that suffer from diarrhoea. As for the number of clinic visits for

children under 5 ("under- 5 clinic visits"), the picture is inconclusive: Children who are undernourished have few under-5 clinic visits, while households with severe or moderate food insecurity show numerous under-5 clinic visits. This inconclusive finding might be since under-5 clinic visits can be a consequence of undernourishment as well as a treatment for it. Nutrition counselling has a positive impact on the minimum acceptable diet of children.

Table 36 shows the factors (positively or negatively) associated with food and nutrition security. The regression analysis (see p. 196) uses the explanatory variables to analyse the determinants of IDDS-CH (row 1 and 2), minimum meal frequency (MMF), MAD for children (row 3 and 4) and IDDS-W (row 5 and 6).

Table 36: Associated factors regarding FNS

Dependent variables	Statistically significant independent variables
IDDS-CH (regression includes HFIES)	Sale of animal products (++), Receiving remittances (++), nutrition counselling through health services (++) and media (++), education of mother (+), caretaking support through siblings (++), household size (-), moderate and severe household food insecurity (--), other caretaking support (-)
MMF	Breastfeeding of children (++), sale of crops (++), sale of animal products (++), income of business / petty trade (++), caretaking support of siblings (++), polygamous family (-)
MAD	Sale of animal products (++), Receiving remittances (++), household size (--), Moderate and severe household food insecurity (--), Nutrition counselling through health services (++) and through media (+), Siblings support caretaking (++)
IDDS-W (regression includes HFIES)	Sale of animal products (++), income from remittances (++), household size (--), moderate and severe household food insecurity (--)

Source: Results based on quantitative statistical analysis of the GIZ nutrition baseline survey in Eastern Province (2015) and Maritime (2016).

Positive and large positive associations are indicated by (+) and (++), respectively. Negative and large negative associations are indicated by (-) and (- -), respectively.

Determinants of undernutrition: Dietary diversity of children

As Haddad et al. (1994) point out, large households logically have a higher demand of food than households with less members (Haddad et al., 1994). The regression analysis shows that household size has a negative effect on children's dietary diversity score (IDDS-CH). As shown in columns (1) and (2), the negative effect of household size decreases if one adds the Household food insecurity variable (HFIES), indicating that the household size reflects the overall poverty level of the household. The age of the mother has no influence on dietary diversity.

Additional income sources are positively associated with the children dietary diversity score. The sale of animal products reflects an increased supply of animal products. Remittances contribute to a larger overall income, and, by "smoothing" income, positively affect food and nutrition security (Thow et. al, 2016). The findings also show that nutrition counselling (i.e. health services, media) has a positive effect on the dietary diversity of children.

The positive effects of economic (e.g. remittances) and behavioural factors (e.g. nutrition counselling) on children's nutritional status is not contradictory nor exclusive. While high income does not automatically mean good nutritional status, both variables are positively associated. Economic endowments (i.e. money, labour, time, land) determine the range of possible behaviours, and thus individual and household eating patterns. In this set of possible eating behaviours, nutrition counselling helps prioritize eating patterns which are most healthy for children and therefore positively influence their nutritional status. On the other hand, a change of behaviour might also positively affect economic endowments by e.g. influencing household health.

Brothers and sisters who actively take part in childcare have a positive impact on the dietary diversity of their younger siblings. The help of the child's grandmother or grandmother-in-law, on the other hand, does not seem to affect undernutrition. The effect of the mother's support is not significant, either.

Minimum acceptable diet and minimum meal frequency

Income sources play a key role for meal frequency. In particular, income from crops, animals and businesses increase the likelihood of children meeting the minimum requirements. This might be due to the increased income from selling surplus or due to edible produce provided by crops and animals. Childcare support from siblings also has a positive impact on children's Minimum Meal Frequency, highlighting the important role of siblings as secondary caretakers.

Dietary diversity of women

The sale of animal products and remittances also have a positive impact on the dietary diversity of women. Women living in a polygamous relation have slightly lower dietary diversity scores compared with women living in monogamous relationships. The negative effects of household size in terms of dietary insecurity are greater for women than for children, which indicates that mothers effectively shield their children from negative external effects (many mothers mentioned such efforts in the interviews).

When the Household Food Insecurity Experience Scale (HFIES) is added to the column (5) of the regression analysis table, the negative impact of having a home garden on dietary diversity is eliminated. An explanation could be that vegetable cultivation is only practiced by relatively disadvantaged groups that do not have the means to buy vegetables. This suggests that household food insecurity and home gardening are adversely related.

6.2 Qualitative Findings Togo

6.2.1 Market infrastructure and business environment

Maritime is densely populated, and most villages are locally connected. An analysis of the National Health Survey conducted in 2013 found that semi-urban areas score higher in education and income levels, but lower in household food and nutrition security, compared to rural areas. An expert proposed that this might be due to semi-urban households' high investment in non-agricultural sectors, which leaves less room for agricultural and horticultural production. The shortage in agricultural production underscores the importance of reliable food markets.

Markets for agricultural products

Local markets in Maritime are mostly within walking distance from villages and provide a diverse range of food stuffs. This proximity of agricultural markets in Togo leads to more transparent prices, and farmers are more likely to negotiate competitive rates. However, the lack of financial resources of most households means that (additional) food items such as meat or even beans are often prohibitive.

Women earn extra money by selling prepared food such as tofu ("fromage de soja"), bean products, or oranges. These practices help contribute to the food security and dietary diversity of the village and provide some income for women.

In Togo, most farmers sell their produce immediately after harvest to cover urgent credits and expenses. This practice drives prices low and reduces the profit margin, thereby increasing income poverty. However, individuals who sell livestock can usually exploit price fluctuations for their own benefit. For instance, prices for chicken triple during festival season and during other religious periods.

Barriers to business opportunities

Sufficient *and* stable income is an important determinant of food and nutrition security. However, regular employment is unavailable to the majority[49], and self-employment in agriculture or petty trade are the only option to generate income [50]. These informal activities are relatively risky as they depend on exogenous factors like weather and price shocks. Mechanisation, contract farming, or block marketing might help increase agricultural income.

Off-farm entrepreneurial activities are also challenging (Table 37): they are quite risky, and households will not abandon their farming activities guaranteeing their survival. As Table 38 shows, only 5 % of the surveyed population has regular salaries that can backup risky business activities.

While the development of non-agricultural entrepreneurial activities is required to raise incomes substantially, the rural environment is not conducive to entrepreneurship: rural markets for non-essential goods are poorly developed, lack market supervision and quality standards. Furthermore, underdeveloped financial markets and high business-risks lead to a lack of capital, creating a vicious circle of underinvestment.

[49] As indicated in the table "Undernourished HH Togo", only 1.59 % of interviewees received a regular salary and only 22.1 % had occasional work. 60 % took part in small business activities, however.

[50] Irregular employment both locally and in other regions (seasonal work migration) is also available but is unstable as well. Migration is not always an option for mothers with infants/ young children.

Table 37: Barriers in opening a business	
Barriers in running or opening a business in Maritime	
Financial resources	Women lack the money to invest in machinery or to buy goods to start a business. Some women have organized savings groups to support single members. Yet, the amounts acquired are usually insufficient to make larger investments. Lending opportunities exist either informally between friends and family, from money lenders who charge high interest rates (sometimes up to 100 %) or from public and private institutions. Private institutions usually require some sort of collateral, which poorer smallholders cannot provide. Official public institutions, such as the Fonds Nationale de la Finance Inclusif (FNFI), typically charges interest rates of 8% but require that the lender take a minimum sum of 100,000 CFA.
The lack of infrastructure, especially electricity	Poor infrastructure makes some entrepreneurial activities unprofitable (or impossible). A baker in Maritime has to travel to a different village just to bake bread. Relying simply on manpower limits business growth. Production of goods is sometimes only possible using higher amounts of energy. Food preparation is a laborious task without electricity, especially grinding wheat or beans or kneading dough. Food production directly influences the supply of cheap food, yet business activities are often not profitable due to infrastructural problems. Even if neighboring villages have electricity or a grinding mill, distances and transport cost limit usage.
Lack of reliable markets	The shortage and low quality of supplies are a frequent impediment to business growth. For instance, many women sell clothes but must travel to Lomé to buy them, which results in extra transport costs. The low demand at local markets close to the villages means that few such markets exist. Purchasing power in more remote areas is especially low for non-essential goods. A dress maker mentioned that the demand for clothes was just not high enough to sustain her business. Low demand for food at local markets has led individuals to sell products in more densely populated areas such as Lomé, where purchasing power is higher. For example, a chicken breeder sells most of his chickens to local restaurants or to traders who sell them in Lomé. As a result, fewer food resources remain in rural areas and prices increase.
Source: Own data.	

Table 38: Income activities in beneficiary villages (n= 258)	
Income activities (in %)	
Selling agricultural produce	83.7 %
Petty trading / small business	52.3 %
Selling animal products	37.9 %
Temporary salaries	12.0 %
Producing or collecting goods	9.3 %
Regular salaries	5.0 %
Remittances	2.3 %
Public transfers	3.8 %
Source: Togo Midline Data, 2018.	

Income and resource generation and expenditure

In Maritime, household's financial resources peak during the harvest season (July/August and November/December), when crops are sold. While this might induce business activities elsewhere, most farmers have no time to run side-businesses during the harvest period. Apart from time pressure, other factors jeopardizing income- generating activities are market risks, machinery failure or unexpected health expenditures.

Throughout the year, typical income activities **of women** include petty trading, tailoring, selling prepared foods and growing vegetables. Typically, women are solely responsible for their own economic activities – buying inputs, cultivating crops, selling at markets and doing investments.

Household expenditures follow a cyclical pattern: depending on season, households spend money on agricultural inputs, education or healthcare (especially during the rainy season as the prevalence of malaria is high). In contrast to Zambia's Eastern Province, where basic healthcare and primary education are free, male and female interviewees in Togo underlined that healthcare and schooling made up the largest share of household expenditures (at 30–50 % each). Due to a chronic lack of financial resources, women are often forced to make critical choices between health, education and food, and are unable to purchase expensive food items such as rice, fish or meat.

6.2.2 Decision-making and bargaining power

The role of gender and traditions in Maritime

In Maritime, women are responsible for domestic work (i.e. cooking, cleaning), childcare, nutrition and health (see also Box 22). In addition, they are also involved in field work, and are expected to collect, and decide on the use of water.[51]

Box 22: Health and traditions

Perspectives on **health decision-making** differ. While the qualitative data shows that some men are actively involved in health decisions and childcare, two separate focus groups revealed different types of household decisions. In the FGD, women and men described men as the main decision makers of the household. Both groups emphasised that women need to ask their husbands for permission before making decisions on health-related spending.

Traditional beliefs are widespread in the project region. Many women seek consultations with voodoo priests for medical problems (e.g. prenatal problems such as swollen legs).

Source: Own data.

Gender dynamics dominate the daily life of the household[52]. Table 39 shows decision-making and bargaining power in the households, revealing that women are responsible for the most time-consuming tasks. Men usually control the households' money. This means that men decide how much money is spent on food items, directly **influencing the quality and quantity of dishes** consumed by the entire family. Men's budget decisions also strongly influence the family's **access to healthcare**. In addition, men control harvest revenues and land resources, and decide on household equipment such as means of transport. Women - on the other side - decide on many nutrition relevant issues. However, their nutrition decisions

[51] Few women receive support in their daily domestic work by men. In case of sickness, some women stated that men would cook, fetch water, collect firewood or care for children. Older children also provide support, as do co-wives in polygamous households.

[52] The baseline study shows that 68.8 % live in a monogamous relationship and 28.4 % in a polygamous relationship (3.3 % are either single, divorced or widowed). Polygamy is particularly common in in the Vo Prefecture (GIZ Nutrition Baseline Survey Togo, 2016)

are constrained by their husband's control of cash. This underscores the need for a strong involvement of men in nutrition related interventions.

Table 39: Control over resources	
Control over household resources and labour division in the households	
Water / Firewood	Women are responsible for collecting water and firewood (men sometimes help buy charcoal), and for cooking (men contribute financially in some cases). "We eat and prepare food from our own stock. Only if our own stock is finished, we go and ask the man."
Transport	Men own and control the means of transport (motorcycle). Women can use their household's means of transport with their husband's permission, but they might need to pay the fuel costs
Agricultural production	Women and men apply their own farming inputs on their own fields. Men are considered more skilled at selecting the right inputs. Crops: Men and women cultivate their own crops on separate fields (women's fields are smaller). Men control how much is given to the wife to meet the household's food demand. Vegetables: Some men produce vegetables for markets, whereas women produce vegetables mainly for household consumption. Market: Women market produce from the men's fields as well as from their own.
Land	Generally, men own and control the land, and allocate farmland to women. Men and women independently farm their shares.
Milling	Grain milling is solely the domain of women. In some cases, men contribute financially.
Source: Own data.	

Intrahousehold allocation

Women have the responsibility to run the household and raise the children. Men are expected to provide money for household expenditures. However, several interviewees said that the funds men provide are often insufficient to cover household costs. As a result, women become the payer of "last resort". It is also customary for a man to allocate a certain share of his produce to his wife (or wives) for daily consumption – usually cash crops such as maize. While men also pay for school fees, women cover health expenditures, which can easily turn into an existential threat.

In **polygamous marriages**, each woman is responsible for her own children and household. According to interviewees, wives rarely cooperate and often compete.

However, in circumstances such as sickness, women take care of another's wife's children.

6.2.3 Agricultural production in Togo

In Maritime, 78 % and 56 % of the surveyed population generate income from crop and livestock sale, respectively. 20 % of the population produces crops exclusively for household consumption (Dadi and Trentmann, 2016).

ProSecAl is active in a set of nutrition-sensitive agricultural interventions (Box 23).

Box 23: ProSecAl interventions in agriculture

ProSecAl introduced **farmer field schools**. The goal of the farmer field school is to provide hands-on training on best cultivation techniques for the crops promoted by the ProSecAl programme. These include soybeans, papaya, moringa, and beta carotene biofortified sweet potatoes (orange fleshed). Beneficiaries are organised in groups of no more than 25 individuals and each group is supervised by a volunteer (fr. "animateur endogene") who is in charge of the farmer field school where the training takes place. The volunteer also accompanies farmers to fields to ensure that the practices are correctly implemented.

The promotion of gardening is another important component of ProSecAl. Beneficiaries are taught on vegetable production and receive seeds of amaranth, gboma, tomatoes and pepper. The intervention proves effective: horticultural cultivation in beneficarry villages is higher than in non-beneficiary viallges.

Another major component of ProSecAl involves technical training on **poultry production** and offers material support (pen construction, feeders, drinkers, and feed). The goal is to improve the consumption of animal protein among women and children within the 1000-day window. To participate in this intervention, beneficiaries must own at least 5 hens and 1 cock. Following accounts of female beneficiaries, poultry production not only increased their protein consumption but also helped genereate additional income .

Source: Own data.

Access to arable land

All households in Maritime have access to land. However, households in Vo (294 inh./km²) and Bas-mono (335 inh./km²) suffer from a chronic shortage of arable land due to high population density. Alongside poor soil quality, the lack of arable land was reported to be the biggest obstacle in achieving household food security. Households in Yoto (133 inh./km²), where the population density is lower, face land scarcity to a minor degree, but its more remote character poses partially difficulties in market access. In relation to Eastern Province and in absolute terms, average field sizes (between 0.5 and 1 hectare) are too small to produce enough to feed an average-sized family

Arable land is acquired through inheritance or purchase, and land rights are controlled by men. Women have land access either through their husband or through inheritance.[53]

In some communities, farmers need to **rent farmland** to reach sufficient production levels. At times, leased land is sold before the end of the cropping season, and tenants are forced to vacate their farm. The difficult access to arable land affects a household's capacity to achieve food security. Some farmers reported that entire families had to relocate due to food insecurity caused by land scarcity (see also Box 24).

Box 24: Land pressure and coping strategies.

Land scarcity in Godjime/Yoto

According to farmers, there are families in the village who have just enough land to establish a homestead but cannot do farming. With average land holdings of 0.5-1-hectare, field sizes are small and do not produce enough for household consumption and income generation. The farmers reported that about 60 % of the villagers are forced to rent land for food production. The cost of renting land ranges between 20,000 and 100,000 XOF and more depending on the fertility of the soil.

Source: Own data.

[53] This also applies to women living in polygamist relationships.

Crop production

The prices and marketability of agricultural commodities strongly determine which crops farmers select for cultivation. Depending on the locality, cash crops other than maize include cassava, cotton (Box 25) and soybeans. Though not the main dietary choice, cassava is sometimes substituted for maize when maize prices skyrocket. Other crops produced in the area include cowpeas, sweet potatoes, beans, groundnuts, millet and sorghum.

Box 25: Cotton supersedes maize

In Yotokopé, increasing prices for cotton have led to the ongoing intensification of cotton production at the expense of maize. When asked about the effect on household food production, a respondent explained: "We calculate the land surface needed to produce enough maize for household consumption, and then we deploy the remaining area for cotton production".

Source: Own data.

Strategies to increase agricultural productivity

Respondents described low soil fertility as a major obstacle to agricultural production and attributed it to erosion and soil degradation. Table 40 describes the farmers' strategies to increase yields.

Table 40: Strategies to increase production

Strategies to increase yields	
Fertilizers	Chemical fertilizers are popular but only affordable for few farmers. Organic materials such as animal manure and plant leaves can enrich soils. However, the availability of organic resources is limited for comprehensive use.
Cultivation	Many farmers increasingly cultivate cassava as it tolerates low soil fertility. Due to the widespread lack of access to arable land, only few farmers rotate crops (maize and soy) and let their fields lie fallow to restore soil fertility.

Source: Own data.

Investments in agricultural inputs and technology are low. Most households use mixed cropping systems dominated by maize and accompanied by other crops, most notably cassava, beans and groundnuts. Farmers with more land practice crop rotation, typically with maize and soybeans.

Climate change already impacts agricultural production in Maritime (Box 26). Scientists predict that the long-term effects of climate change in Maritime include changing rain patterns with higher risks of draughts (Koffi and Komla, 2015) and rising temperatures (Koudahe et al., 2017).

Box 26: Climate change in Maritime

Farmers understand climate change as changes in weather, most notably precipitation patterns. The two distinct rainy seasons that are typical of Maritime region have begun to merge, with heavy rains falling all at once and longer dry periods. Farmers stressed that cropping systems are not adapted to these changes. Volatile weather, shifting seasons and insufficient rainfall were often mentioned as challenges to crop production affecting sowing times and germination.

Source: Own data.

Within the prefecture of Yoto, farmers with sufficient land resources produce **teak** as a form of medium-term investment. They use a **taungya farming system** in which maize is planted alongside teak until the teak canopy becomes too shady for maize cultivation. Due to land scarcity, farmers cannot afford to let a field lie fallow.

Horticultural production

Figures of horticultural production in the project region range from 25 % in non-beneficiary villages to 40 % in beneficiary villages of **ProSecAl.** The residents of beneficiary villages attributed their higher horticultural production to the ProSecAl interventions. Households without vegetable production rely on market products, wild foods and leaf consumption (i.e. cassava and cowpea leaves). In Maritime, only few families with access to land close to rivers have the possibility to produce **vegetables all year-round**. Some families draw water from wells and boreholes,

but for many, water sources are too far from the gardens. In most cases, horticultural production is the responsibility of women.[54]

Vegetables are mostly grown in small subsistence gardens; commercial production is much less prevalent. Typical vegetable crops include tomatoes, amaranth, pepper, spinach, okra, jute mallow (adémè), and eggplants (African eggplant or gboma). Still, production levels are often insufficient, and households have to buy additional vegetables to cover their needs. In one village, farmers stated that the local availability of vegetables on the market was limited since commercial producers preferred to sell outside the village to achieve a better price.

Animal husbandry

Animal husbandry is the second most important source of household income after crop production, contributing about 30 % of household income. Most livestock (goats, sheep, and pigs) and poultry (ducks, chickens) is small scale and partly free-range. Commonly, livestock is not raised for household consumption, but rather kept as living saving for sudden expenditures such as the payment of school fees, health bills, funerals, repaying debt or times of financial hardship. As in Eastern Province, livestock production becomes a vital source of cash income in periods of hunger, strengthening farmer's resilience.

Agricultural value chains and cooperatives

Agricultural value chains are generally limited to primary production with little or no added value in the villages. Women are engaged in the **processing of palm oil and gari** (flour from cassava). Processing cassava into gari is one of the main sources of income for many households.

Farmer cooperatives are rare and the ones that exist are often malfunctioning. One example is Sagadakopé, a village in the Vo Prefecture, where a cooperative founded by an NGO helps farmers store, produce and sell their agricultural products (if prices rise). Local farmers said that after repaying debts and school fees, they did not have enough surplus cash to participate in the cooperative. Strengthening cooperatives requires a multi-sectoral approach to guarantee their sustainability.

[54] Men in Maritime are also involved in horticultural production, although their efforts are concentrated on commercial produce and income generation.

6.2.4 Diet and nutrition in Togo's Maritime Region

The typical diet in the Maritime region

In the Maritime Region, local diets mainly consist of maize and cassava. The qualitative study in Togo revealed that household diets are monotonous and meal frequency inadequate. The typical diet in the project region is pâte (a maize porridge rich in carbohydrates (Box 27)). Figure 9 shows a picture of a traditional meal with sides. Most households cannot afford meat nor fish.

Figure 9: Pâte with typical sides in Maritime

Source: Private.

Box 27: Typical diet in Maritime

The typical diet in the project region

The main staple foods are *pâte* (made of maize, manioc, or soy), *foufou* (made of manioc or yams), *akumé* and *gari*. Less common staple foods are rice, pasta and bread. The main staples are traditionally accompanied by vegetable sauces containing *gombo* (okra), *gboma* (African eggplant), tomato, chili or onion. The sauces also contain green leafy vegetables such as *adémé* (a local spinach), potato and sweet potato-, manioc-, moringa- and amaranth leaves. Fruits such as banana, papaya, orange, lemon, pineapple, mango, coconut, watermelon, avocado, and guava are consumed as snacks.

Source: Own data.

Women said that three meals per day was the ideal **meal frequency**. However, mothers said that they ate only twice a day, while their kids received three meals a day. Many women reported that meal frequencies are more irregular during crisis such as the "hungry season".

As in Eastern Province, food and nutrition security depends on the season. The severity of the so-called "période de soudure" ("hunger gap") in Maritime depends on the local harvest and rain patterns and varies significantly across households and communities. For example, households of Yotokope reported to face food shortage between May and June, while farmers in Godjinme said that the last hungry season lasted from January to June. Both villages are located in the Yoto prefecture. The respondents attributed the shorter hungry season in Yotokopé to a locally strong rainy season that produced better yields. Communities in all three provinces described the period from January to April as most severe (Figure 10). Maternal diseases such as malaria and diarrhea peak during hungry season and pose additional risks (Moore et al., 1999).

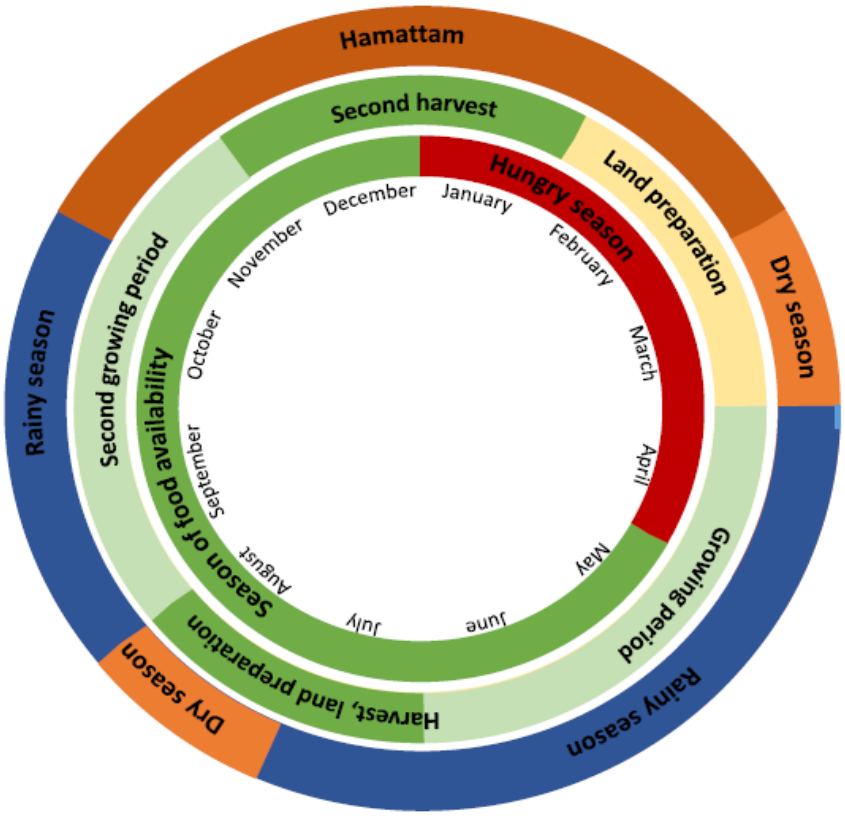


Figure 10: The seasonality of the 'periode de soudure' (hungry season)

Source: Own data.

Households use several strategies to cope with the food shortage during hungry season, including a change of dietary habits and periodic migration (Table 41).

Due to household's pressing need for cash and food resources, prices for staple foods increase four- to fivefold. As in Eastern Province, some households have to buy back their previously sold harvests at higher rates. This anti-cyclical market behaviour results in an actual loss of household income.

Table 41: Coping strategies during the hungry season

Coping strategies during the 'periode de soudure`	
Changing nutrition habits	Households change their eating habits and reduce the quantity of food intake by skipping meals. This affects adults as well as children. Besides quantity, the quality of meals is also reduced. The food consumed is less diverse and contains fewer micronutrients. Households reduce their intake of meat, fish and eggs, and replace maize with gari since maize stocks dwindle. They also trade food with neighbours. However, as most households are in a similar situation, they can only trade limited quantities.
Seeking for finances	Households and individuals seek additional financial resources to cope with the shortage of staple foods. It is common to sell livestock to raise money and pre-sell crops prior to harvest. Due to their high bargaining power, buyers usually determine low prices. Individuals doing off-farm work outside communities generally receive low wages due to the high demand for work during that time. Women produce and sell sodabi (a locally brewed alcoholic beverage) or charcoal. To obtain cash, people receive loans from informal money lenders.
Periodic migration	Periodic migration is another important economic strategy. Some individuals stay within the region (moving towards bigger towns and the capital Lomé) while some seek work outside the country in the ECOWAS region, most importantly in Benin and Nigeria. Periodic migrants often take up casual labour as farm hands or on construction sites and send remittances home to their families. Remittances may range from 10,000 to 30,000 XOF / month. Migration generally follows a cyclical pattern, and individuals return at the beginning of the farming season to tend their fields.

Source: Own data.

Consumption of animal protein (fish, crab meat, eggs and chicken meat) is low. Households do not consume their own animals, except for small animals such as chickens during festive periods and celebrations (e.g. Christmas, Ramadan,

outstanding achievement in school). Goats and sheep are always sold and not consumed. The **ProSecAl**'s **chicken rearing intervention** has had mixed results on animal protein consumption. Some respondents indicate that they are eating chicken more frequently, while others report to consume chicken only during festive periods. In either case, respondents said that they rarely consume their own chickens because they are such an important source of income. Interestingly, those who consume chickens buy them from other people. **Egg consumption** is very low in both beneficiary and non-beneficiary villages.

Wild products

Wild food products (NTFPs) form an integral part of the daily diet in the project region. Wild foods are generally comparable to cultivated species and can serve as their direct substitutes. However, NTFPs are not always available (Box 28). **Wild green leafy vegetables,** for example, are appreciated for their medical as well as their nutritional value, and are mostly available during the rainy season. As households do not preserve wild foods, their durability is limited. The consumption of NTFPs varies by availability (location). As one person told the team, "In the past, [people] depended on wild vegetables; today, some vegetables are also cultivated but a higher percentage of the vegetables consumed are purchased".

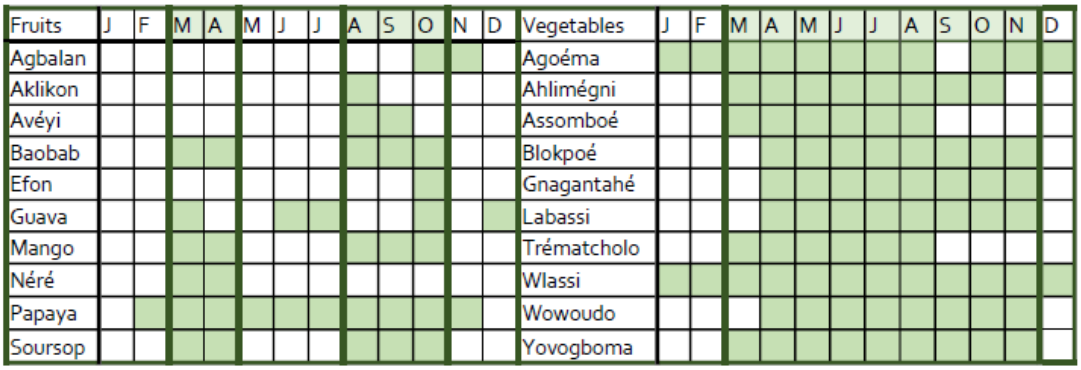
Diet during pregnancy and breastfeeding

In Maritime, the awareness about the special needs of mothers during pregnancy has improved. Female interviewees mentioned the various positive health effects of fruits, vegetables and fish, and know that a diverse diet has a positive effect on the health of breastfeeding mothers. **Mothers and grandmothers of pregnant women** have influence on their daughters' diet. One young woman said that her grandmother "tells me which foods I should eat, to eat anything I like, and that I shouldn't work hard."

The importance of breastfeeding for infants under the age of six months is well known. While many women told the team that they breastfed their young infants exclusively, several women (in beneficiary and non-beneficiary villages) indicated that they began to supplement breast milk with porridge as early as four months after birth. In terms of complementary feeding, several women said that they fed their baby porridge or the same food as the rest of the family from the age of seven months. Women learned from ProSecAl how to prepare baby food with roasted soy, maize flour and moringa. A few women (NB) mentioned to prepare maize porridge for their baby enriched with soy, sorghum, rice, peanuts and fish.

Box 28: Wild food items and seasonal calendar in the project region

The role of wild products in the local diet: The wild vegetables in the project region comprise *trématcholo*, *assomboé*, *agoéma*, *ahimégni*, *yovogboma*, *wlassi*, *wowoudo*, *blokpoé*, *labassi* and *gnagan-tahé*. **Free growing fruits** are also available in the wild and include mango, baobab, guava, cashew, pawpaw, hog plum, locust beans, black raisins, wild soursop, *efon* (raisin noir), *spondias momin* and *agbanla*. People harvest wild fruit and vegetables for household consumption and sale. Due to the rarity and market value of some wild fruit, competition among foragers is not uncommon. *n*. **Wild animals** such as rodents (*agoutis*, squirrels, beavers, cane rats, etc.), fowls (partridges, turtle doves), tortoise and frogs play a less significant role in diets due to their declining numbers. Communities attributed this to demographic pressure, overhunting and agricultural practices. Other wild products for private consumption and sale include **mushrooms** (most semi-cultivated on decaying palm trees) and **honey**.



Fruits	J	F	M	A	M	J	J	A	S	O	N	D
Agbalan										■	■	
Aklikon								■				
Avéyi								■	■			
Baobab			■	■				■	■	■		
Efon										■		
Guava			■			■	■			■		■
Mango			■	■				■	■	■		
Néré			■	■								
Papaya		■	■	■	■	■	■	■	■	■	■	
Soursop			■	■				■	■	■		

Vegetables	J	F	M	A	M	J	J	A	S	O	N	D
Agoéma	■	■	■	■	■	■	■	■		■	■	■
Ahlimégni			■	■	■	■	■	■	■	■		
Assomboé			■	■	■	■	■	■				
Blokpoé				■	■	■	■	■	■	■	■	
Gnagantahé				■	■	■	■	■	■	■	■	
Labassi				■	■	■	■	■	■	■	■	
Trématcholo			■	■	■	■	■	■				
Wlassi	■	■	■	■	■	■	■	■	■	■	■	■
Wowoudo				■	■	■	■	■	■	■	■	
Yovogboma			■	■	■	■	■	■	■	■	■	

The annual availability of selected wild products shows that wild foods (especially vegetables) are abundant during the rainy season, while fruits are also plentiful during the dry season. This data has been sourced from multiple villages.

Source: Own data.

A high prevalence of early pregnancies

In the project region, marriage and early pregnancy among girls under 18 years is common (IDRC 2018).[55] Birth control is a sensitive topic and awareness raising is restricted by traditional beliefs, gender, and the lack of contraceptives.

[55] One primary school teacher reported that 25 % of young women drop out of school due to pregnancy.

Experts and volunteers attributed teenage pregnancies to a lack of education, lack of contraceptives, social pressure and, to a lesser extent, voodoo. Early pregnancies affect **the health of mothers and children** in many ways. Young girls try to hide their pregnancy as long as possible by eating less.

Furthermore, early motherhood requires additional spending and the lack of money adversely affects the quality of childcare. This is a very important aspect of food and nutrition security among mothers and children: according to the NGO Crema, the age of the mother and the number of children have an impact on household food and nutrition security in the project area. In the case of early motherhood, other caregivers play an important role. In case the mother is absent (for example, due to periodic migration), other family members (grandmother, father, siblings) take care of the infant.

Nutrition education – Cooking demonstrations as a communication channel

Knowledge about nutrition directly affects food intake and health. Women in beneficiary villages had a better understanding about the importance of dietary diversity.

Traditionally, mothers pass down recipes to their children (mostly to the girls), who begin to learn how to cook between age six and ten. Only few women are familiar with preservation techniques. Quite often, fruits and vegetables spoil fast and are thrown away.

Female interviewees in beneficiary villages value the **ProSecAl cooking demonstrations (CD)** for the information on nutrition and household hygiene. They suggested to include men in the CD: "Men need to participate in these sessions because the method will push them to invest more in food and to reproduce these recipes when the women are not there." While some women stated the CDs were a time burden, others wished that they took place more frequently: "It could happen even more often, even once per day." Some described difficulties to cook soy-based recipes, as they were not able to use a soy mill or lacked time to process soy.

Information on health and hygiene is transmitted through various channels. Interviewees mentioned **ProSecAl agents** as the most important source of information on health and hygiene, followed by the local health centre and the radio. Education on health and hygiene in schools depends on the initiative of individual teachers.

The internal and external migration of the population influences dietary behaviour. Younger women expressed the desire for more modern foods from the capital

Lomé (as pasta) and said that they did not like the taste of traditional foods such as *pâte* anymore. Due to migration, new recipes are brought to the villages: young adults who spent time in other regions teach their friends, mothers and/or siblings' new recipes. One woman said, "The things we cook always change." Another one said, "I'm interested in new recipes and like writing them down."

6.2.5 Limited access to WASH & health facilities

Access to water

Though **awareness** of the importance of clean drinking water is high among the population, many farmers (have to) use water from defective and contaminated groundwater sources in the region (Table 42).

In the project region, access to clean drinking water is severely restricted due to poor water infrastructure, poor maintenance of water sources and widespread poverty (Table 43). The limited access to and low availability of (drinking) water worsens during the dry season. Communities and individuals use different **instruments and techniques to purify water** such as aquatabs[56], chlorine, filtering and purification with ground moringa seeds.

Table 42: Different sources of water

Water sources and usage	
Borehole[57]	Water from boreholes is the cleanest source of household water and almost exclusively used for drinking. However, it is fairly expensive (around 25 CFA per bowl) and can be unaffordable for poor households.
Well	Water from wells is used for cooking, washing, hygiene and drinking. While well water is for free, it can be contaminated by dirt, insects, worms, algae and bacteria, posing a serious health risk.
Rain and river water	In many small villages, residents must travel long distances to reach the nearest boreholes. As a result, they frequently turn to rivers and runoff for water despite high risk of contamination. The use of rain and river water for drinking is directly linked to disease.

Source: Own data.

[56] Individuals stated to have concerns about their health using aquatabs.

[57] Many boreholes are constructed by both international donors (e.g. European Union, UNDP and smaller local organisations.

Table 43: Limited access to drinking water	
Barriers in access and availability of drinking water	
Economic barriers	As many households face economic constraints to access clean drinking water, they consume water from open wells, rivers, or rainwater despite the risk of contamination.
Water infrastructure	Villages often do not have access to water, and women, who are responsible for fetching water, need to walk far to collect it. y Carrying water over long distances not only consumes women's precious time but are also physically exhausting, especially for elderly or pregnant women.
Maintenance	Poor well maintenance often results in inaccessibility or contamination of water sources. In many places, there are no functioning water committees to maintain the sources.
Source: Own data.	

Disease and health expenditures

Almost all villagers said that they suffer from either constant or reoccurring **malaria** in combination with fever, diarrhoea and fatigue. Pregnant women and children under age 5 are especially at risk of malaria due to their weaker immune systems (Global Fund, 2018). Sickness affects people's ability to work in **agricultural production** and generate income. Women said illness kept them at home for 15–30 days a year, depending on the severity. For treatment, many individuals use medicinal herbs first (e.g. papaya leaves, baobab fruit, hog plum and spondias mombin / anacardiaceae spp.) and go to health centres only when traditional treatments have failed.

Nutrition-related diseases, such as anaemia, diarrhoea and intestinal pose big difficulties to women. Women in all villages complained about high rates of **diarrhoea**. Breastfeeding mothers are more likely to transfer diarrhoea to their babies when general hygiene conditions are inadequate. Some women attributed incidences of diarrhoea to pesticides but argued that the use of pesticides was necessary due to declining soil quality.

In reducing diarrhoea, a multi-sectoral approach is needed. Women in a beneficiary village gave the following reasons for a reduced incidence of diarrhoea: (1) interventions such as handwashing promoted by ProSecAl; (2) improved availability of clean drinking water; (3) the construction of boreholes in two

neighbouring villages; and (4) the introduction of government training programmes for traditional healers.

Inadequate access to WASH- and health facilities

The access to sanitation- and health facilities in the region is limited. Due to inadequate healthcare and hygiene practices, **the target group's health-related expenses** are high: health is the number one expense among all surveyed households (before education and additional food) and often makes up 50% of expenditures. Some women said that they "forget about buying food because we have to spend money on health issues." Moreover, they explained, the need for quick cash to cover medical treatment forces them to sell agricultural products at unfavourable prices.

The majority of villages do not have a health station, infrastructure is poor and transport options are few (especially during rainy season). **The few health facilities** that exist are inadequate (no electricity nor running water) and lack medical equipment to diagnose stunting (i.e. scales, growth charts) (Box 29). The lack of adequate local health facilities means that residents incur extra expenses for transport at night, no form of transport is available.

Sanitation facilities, toilet usage and handwashing

Most villages have only few hygiene sanitation facilities such as latrines or handwashing facilities. **Open defecation** next to houses or in nearby bushes or fields is not uncommon. In some villages, residents cover faeces with palm strands and ash. No governmental hygiene programme is in place to promote sanitation and hygiene. The poor management, and the lack of sanitation facilities contribute to the spread of diseases.

The construction of latrines is too expensive for most villages (EcoSan toilets cost 40,000 XOF and pit toilets cost 4500 XOF; Box 30) Villagers asked for toilets and landfills located away from their homes. They said they were willing to maintain public latrines; in their view, a steering committee could be responsible for running the facilities.

Box 29: Identification of stunting and access to health facilities.

Identification of stunting

Some health workers (HW) had difficulties to identify stunting and to relate the causes and symptoms of undernutrition. Many health centres lack growth charts, scales and measuring devices. In one beneficiary village, nurses identified stunting and related it to "small children eating too little and too few vitamins." ProSecAl recommends interventions and nutritional education for mothers. For mothers, stunting was difficult to grasp, and they related it mainly to protein malnutrition because images of a child suffering from kwashiorkor have been shown to them at the health centre.

Access to health facilities

In Avégodé, the next hospital is more than six kilometres away. People walk or take a motorbike taxi to reach the facility. Frequently, women give birth while on the way to the hospital. Men believe that this is a reason why women get sick. Women stressed that if people feel sick, they walk even further to the next bigger hospital.

Source: Own data.

Box 30: Composting toilets

Composting toilets/Ecosan toilets

An expert from the German Red Cross stated that people first disliked the Ecosan toilets, but, having experienced positive effects on health, hygiene and agricultural output, eventually approved the composting toilets. Now, the benefits are well known. To ensure sustainable practices, the German Red Cross installed field schools near the roads to inform farmers about the agricultural benefits. The organisation highlighted the importance of building toilets in cooperation with local villagers. UNICEF is also very active in the construction of latrines. At schools, pupils build and maintain latrines.

Source: Own data.

Awareness about the importance of **handwashing** is rare, and only a minority has access to handwashing facilities (such as tippy tap bottles). Households reported that they learned from ProSecAl that handwashing would help eliminate microbes.

A major challenge is availability: tippy tap bottles are placed in open spaces and are often broken or stolen.

Childcare at health facilities

The number of **pre- and postnatal care** visits of women is often limited by a lack of knowledge, a lack of financial resources, a lack of decision-making power and lack of access. Free initial consultations for pregnant women provide basic information about living with pregnancy, malaria treatments and preventative mosquito nets. **Paid services** include medication, dietary supplements, ultrasounds, consultation programmes, blood tests, and checks for parasites. **Special consultations** are provided to women with physical conditions that could complicate pregnancy, including undernourishment, stunted growth (under 1.5 meters) and obesity.

Fees for **giving birth** are high and unaffordable for many women. Prices range from 2,000 to 10,000 CFA (for caesarean sections). Fees of health centres and private hospitals do not differ much, but women prefer to deliver in private clinics due to the availability of credit payments for prenatal consultations. Home births are commonplace due to the high cost of prenatal care. Women who opt for home birth often visit a care centre the following day for a check-up.

Experts, community leaders and individuals reported a high risk of maternal deaths in home births. Following experts, the high risk of maternal death was due to the limited use of health services attributable to the lack of awareness, lack of money, lack of access to facilities with pre- and postnatal treatment and to a high workload of the mother.

Box 31: Postnatal treatment

Health workers in the project region described the ideal postnatal treatment to prevent stunting as follows: Immediately after delivery, a baby receives a vitamin K1 supplement to prevent blood clots. After drying the baby, the midwife measures parameters such as weight and height, head circumference, MUAC and malformation using standard reference values from WHO (<2500gramms = underweight, >50cm normal height). Infants receive vitamin A with 9 months and the vitamin complex ADEK for the first year.

Source: Own data.

During **postnatal care** visits (usually two visits in the first four months; Box 31), new-borns receive vaccinations and are checked for stunting. Health workers

instruct women to breastfeed their infants exclusively for the first six months and teach them on a nutritious, iron- and folic acid-rich diet including the leaves of cassava, amaranth and moringa. **Undernourished** children with symptoms of stunting and wasting may be transferred to another hospital.

6.2.6 Information channels in Maritime[58]

The ProSecAl programme puts a strong focus on community education in order to improve the nutritional status of households. ProSecAl's scheme is based on existing extension structures setup by ICAT (Institut de conseil d'appui technique) and other NGOs. The role of change agents is split into two: "animateurs technician" (AT) and "animateurs endogène" (AE) (Box 32).

Box 32: Volunteer structure within the ProSecAl-programme

Extension services deliver nutrition-sensitive interventions in the project region. **Animateurs endogèn (AE)** are the main change agents in communities. Under ProSecAl's instruction, they teach individuals nutrition-sensitive practices and livestock production. They conduct follow-ups to make sure that taught practices are correctly implemented. At the farmer field schools, they teach farmers cultivation techniques for crops and offer guidance on other farming practices. Each volunteer is responsible for around 25 people. **Animateurs technician (AT)** train and accompany the AE. The AT are specialists selected and employed by ICAT or from another NGO. They are responsible for 10 – 20 volunteers. **Community health workers** (**CHW**) are responsible for awareness raising on the relation of diet, sanitation, hygiene and health. They are an integral part of the health system and are trained regularly. They monitor child development and examine sick children on common ailments (i.e. malaria). **Women Leaders and "Mere Lumières"** are responsible for the cooking demonstrations. Mere Lumières are chosen on merit to assist the women leaders and act as role models to motivate others.

Source: Own data.

[58] Details on information dissemination and social behaviour change communication are explained in the Zambia section and the methodology section.

Multiple media channels

Radios are the most common and popular media channel in the Region: most respondents mentioned that they own a radio. Table 44 shows the number of adults who own a radio or a phone and have internet access (ITU, 2017; Myers, 2008).

GIZ's green innovation centre programme (ProCIV) in Togo emphasises the importance of radio to deliver information to illiterate individuals. In collaboration with ProSecAI, ProCIV created a series of **radio shows** which are broadcasted in 15 local languages on 20 radio stations throughout Togo. The shows are a recording of two farmers talking on different topics, and each episode is broadcasted four times a week. ProSecAI also delivers radio shows on crop production and nutrition topics. In Sagadakopé, villagers have adopted several practices learned from radio programmes, for example on moringa cultivation.

Table 44: Media use

Media device ownership (in %)	
Radio total	87 %
daily use	57 %
Phone ownership rural urban	60 % 91 %
Internet access	11 %
Internet usage	8 %

Source: ITU, 2017; Myers, 2008.

Mobile phone technology also provides access to information. In neighbouring Ghana, for example, farmers receive location-specific weather information, market prices of certain commodities and advice via voice messages or SMS (ESOKO, 2018)[59]. Following ProCIV, **push-SMS** services are a cheaper alternative to radio programmes. Each message costs only about 10 CFA. Web based applications are another cost-effective tool, although mobile internet access in rural sub-Saharan Africa is low.

[59] Website information https://www.esoko.com/informationservices/ accessed on 11 November 2018

Many villagers have phones despite the high costs (and often lack of) electricity to charge batteries. Experts estimate phone ownership to be around 40-50 %. Most people own simple mobile phones, and smart phones are not common. For example, in Godjinme, a village home to around 5,000 people, only four people own a smartphone with functioning internet access.

Community mobilization and advocacy influencers as change agents

For social behaviour change communication (SBCC) strategies to be effective, the programme employs local influencers (i.e. change agents) that provide support and teach communities on agricultural and nutritional topics. The ProSecAl agents are well known and respected within the communities. Other potential influencers are either authority figures, e.g. village chiefs and notables or people with a high social status e.g. elders, professionals, nurses, teachers, traditional healers and religious leaders (Table 45).

Table 45: Ranking of influencers according to their levels of influence in Tannou, Bas-Mono prefecture

Degree of influence	Nutrition	Health	Agriculture
High	CHW, Femme Leader, Femme Lumière, RFS, AE	CHW, Femme Leader, Femme Lumière, RFS	AE, AT
Medium	Teacher, Radio, Comité de gestion, relatives, AT, Parents	Teacher, Radio, Comité de gestion, relatives, AT, AE, Pastor	Teacher, Radio, Comité de gestion
Low	Mobile Phone, Headmen, Notable	Mobile Phone, Headmen, Notable, Mobile Phone	Mobile Phone, Headmen, Notable, CHW, Femme lumiére, Femme leader, Pastor, Relatives, RFS

Source: Own data.

In beneficiary villages, ProSecAl workers (i.e. Community health workers - CHW; Head of health training – HH; Animateur endogène – AE; Animateur technicien- AT) were regarded as the community members with the highest level of influence on nutrition, agriculture and health decisions of households. In Anévé, the AE were praised for their assistance on agricultural production and ranked top as the most

effective means of knowledge transfer. Kolping[60] representatives also said that the support of ProSecAl AEs was a major success factor in improving food security interventions.

[60] The International Kolping Society is today represented in 60 countries with over 450,000 members. At local level, they are organised as 5,000 Kolping families, which see themselves as self-help groups. Kolping's engagements in Togo includes amongst others food security and livelihoods within the framework of the SEWOH (Kolping, 2019).

7 Similarities of the two project regions

This section contrasts the determinants of food and nutrition security of households in both project regions in respect to the conceptual framework.

7.1 Characteristics of households

The findings of the **quantitative analysis** of the baseline data of Eastern Province and Maritime indicate that the main determinants of food and nutrition security are (1) income-generating activities, (2) governmental services on nutrition counselling and health and (3) secondary caregivers' awareness of a healthy diet. The analysis also revealed that the household size is a determining factor in both project regions (Table 46).

Table 46: Determinants of food and nutrition security	
Determinants of undernutrition (regression analysis)	
Income	Income has a strong negative influence on dietary diversity. Children are more likely to be food and nutrition secure when the household engages in off-farm activities (i.e. the sale of animals)
Caregivers	The influence of other caregivers (i.e. siblings, grandmothers) has a strong influence (positive and negative) on dietary diversity.
Nutrition counselling & care	Nutrition counselling on dietary diversity and care visits statistically reduce undernutrition
Household characteristics	The larger a household, the more likely children suffer from undernutrition.
Source: Empirical data from multiple-regression analysis.	

7.2 Factors affecting food and nutrition security

The qualitative results show the **multi-causality of the determinants of food and nutrition security**. Determinants of food and nutrition security are strongly interrelated on all levels. As the findings of quantitative results suggest, the qualitative results highlight the crucial role of financial resources for households' food security. Table 47 describes potential key drivers in the reduction of stunting.

Table 47: Potential key drivers in reducing stunting	
Key drivers	
Financial resources	The qualitative research confirms the quantitative results. The chronic lack of financial resources and the irregularity of income is mainly due to irregular harvest quantities and hinders investment in agricultural inputs, new business opportunities, or transport and education.
Water	Access to and availability of water affects food and nutrition security on various levels. Water is essential for agricultural and horticultural production, communities, household activities and hygiene. Access and availability of clean drinking water affects health status and the uptake of vitamins and minerals (Smith and Haddad,2015).
Gender	Gender roles affect women's limited access to various resources (i.e. land, inputs and financial resources. Early pregnancy is prevalent and affects the health status of the mother and child. Yet, women do a large share of farm work[61] in addition to other duties. This results in a high work- burden for women. However, men are often the main decision-makers and control important resources when it comes to food and nutrition-related decisions.
Source: Smith and Haddad, 2015; own data.	

Figure 11 illustrates the determinants influencing the nutrition status of the target group in both project regions. Basic determinants are shown in grey, underlying factors in orange, and immediate factors in red. In the fight against stunting, interventions should not single-out individual determinants, but focus on their interdependencies. Based on this insight, the recommendations are developed (see chapter 8).

Figure 11: Interrelationships between the determinants affecting the food and nutrition situation of the target groups (p. 120) highlights the influence of rural poverty and the lack of financial resources (blue, on the right) on the target group's food and nutrition security. Discrimination against women, and the associated high prevalence of early motherhood, affects other underlying and immediate determinants.

Access to and availability of water have two main characteristics. Households not only need water for consumption but also for household use. Access and availability

[61] For Eastern Province, Simute et al (1998) note that women spend three times more time in the fields than men.

of clean water is essential for all three underlying determinants of food and nutrition security, namely: (1) the household food and nutrition security, (2) care, feeding and dietary practices, and (3) the WASH & health environment of all households.

The quantity and quality of the household's food resources is insufficient in both regions. Low agricultural production is influenced by various factors including the lack of water, post-harvest losses, limited access to inputs (i.e. seeds, fertilizers, technology and mechanization), deficient cultivation patterns, changing weather due to climate change, lack of arable land and soil degradation. The latter also affects the availability of wild foods.

Various basic determinants (i.e. geographical isolation, infrastructure, gender with the associated high work-burden of women) influence each other and the underlying determinants of food and nutrition security. Chapter 7.2.1 outlines their inter-dependency.

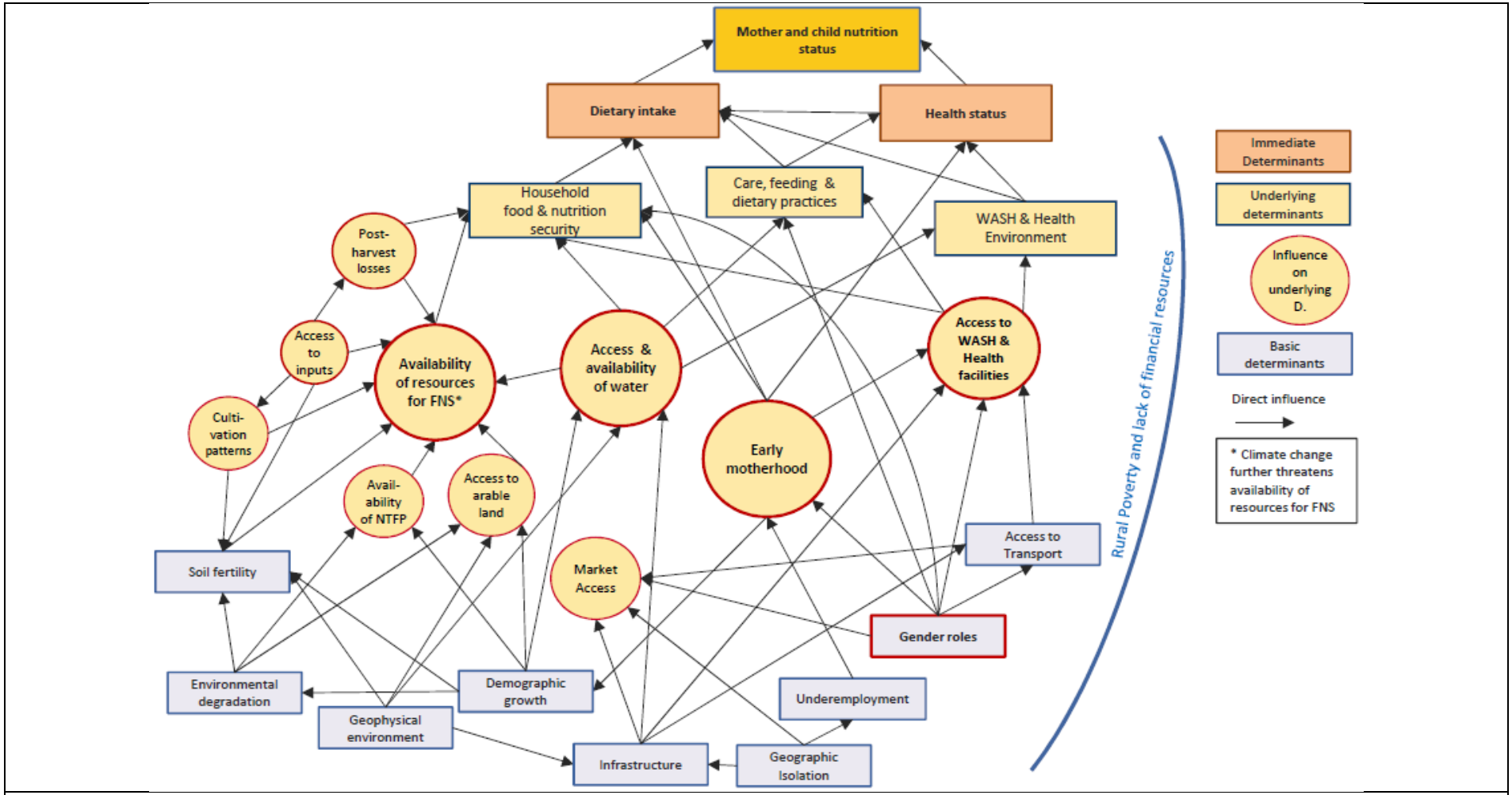


Figure 11: Interrelationships between the determinants affecting the food and nutrition situation of the target groups

Source: Own illustration based on empirical findings.

7.2.1 Basic determinants and structural factors

In both regions, political, economic and socio-cultural factors hamper dietary change:

- Prevailing **resource and income poverty** in both regions. Households have few alternative sources of income for men and women. Land poverty (and increasing population density) in Togo and low soil fertility and long distances (weak infrastructure, distant markets) in Zambia obstruct income generation.
- **Discrimination against women**. Women are confronted with structural disadvantages on multiple levels, resulting in limited decision-making power and little control over household resources (i.e. access to land, financial resources, modes of transport and agricultural inputs). Women are responsible for a great share of the field- and housework and have little time available to invest in (additional) income generation, processing of agricultural goods, horticultural cultivation or childcare. The high percentage of early pregnancies is a direct result of gender inequality and associated with a higher risk of child stunting.
- **High time burden**. Farmers, and especially women, have difficulties to allocate time to diversify production, invest in additional income-generating activities (throughout the year), and care for their children. As a result, households lack the opportunities to diversity diets. The high work-burden can be attributed to the lack of technology and mechanization (resulting in time-intensive food preparation, agricultural production and horticultural cultivation), limited access to water, difficulties in accessing transport and poor infrastructure.
- **Market access and income opportunities**: Infrastructure (i.e. roads, electricity) in **Eastern Province** is poor. Local market infrastructure is underdeveloped, and business opportunities are absent. Transport services to neighbouring villages and urban centres are deficient. In **Maritime**, local markets are better developed and prices are more transparent. As a result, farmers have more opportunities to negotiate prices. However, the chronic lack of financial resources limit farmer's purchasing power. Market prices are a main (dis)incentive for farmers to (continue) produce a certain crop. As

prices for agricultural products are prone to fluctuation[62] , the processing of agricultural products (i.e. soybean) can be an asset when market conditions are unfavourable.

- **Access to land**. Access to land is particularly difficult in Maritime. A high population density and continued population growth limit the availability of arable land (land pressure also is associated with the decrease the availability of NTFPs).
- **Local influencers:** All communities in Eastern Province have locally recognized traditional authority structures. Customary headmen and chiefs have high influence on community affairs, and many of them support nutrition- interventions. Their influence and authority can help promote food and nutrition security. In Maritime, traditional authorities are not widely recognized. Community structures are weak, and this requires identifying key influencers on a local level.

7.2.2 Household production of food resources

As the economies of rural areas are mostly agrobased, a diversified **agricultural production** can improve not only the economic situation but also **dietary diversity**. Smith and Haddad (2015) find a high correlation between dietary intake of non-staples and reduced child stunting (Smith and Haddad, 2015). Figure 12 illustrates measures to increase and diversify the household's access and availability of resources (as an underlying determinant) to improve dietary intake.

Agricultural production in both study areas is concentrated on staples and characterised by insufficient yields and lack of diversity. Low yields have multiple causes, including limited access to (adequate) fertilizers, manure, agricultural inputs and machinery[63], low availability of agricultural extension services, lack of fertile land and water[64] . Furthermore, **climate change** poses a major problem in both regions, causing erratic rainfall patterns and rising temperatures.

[62] In Zambia, soybean and cotton prices fluctuated, reported a representative of the Ministry of Agriculture. In the 17/18 harvest season, prices for soybeans dropped by 44 % percent, with lowest prices in the Eastern Province (Chapoto et al., 2018).

[63] In Eastern Province, only 0.8 % of the farmers practice ripping with mechanical power (Chapoto et al., 2015).

[64] In Zambia, treadle pumps have been distributed, as recommended by the project. Its direct influence on nutrition security is still uncertain, however, because only a small number has been distributed to date.

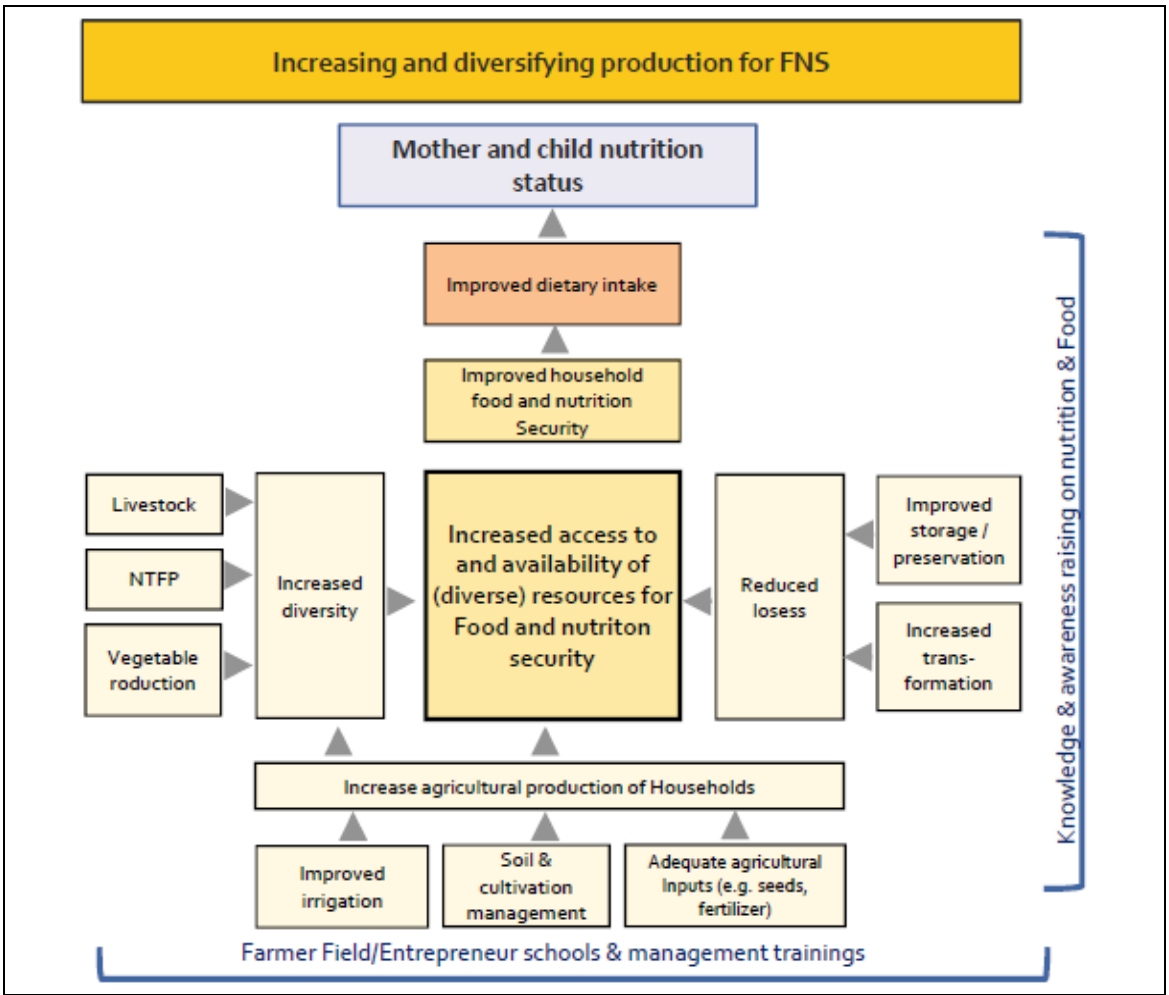


Figure 12: Increasing and diversifying agricultural production

Source: Own illustration based on empirical findings.

In both project regions, the **"hungry season" is a reoccurring feature** and households have developed different strategies to cope with this periodic shortage of food. However, many of these strategies reinforce poverty and food shortage, leading to a vicious circle that threatens household's food and nutrition security throughout the year. Therefore, programmes should focus on local adaptation strategies and to tailored interventions aiming at a higher level of resilience. Despite their declining availability, wild foods are assets in crisis situations (i.e. famine seasons, poverty). Horticultural production and the collection / consumption of wild foods can increase the regular availability of nutrient-rich food

items, because different vegetables and wild plants are available throughout the year.[65]

Agricultural production has a direct influence on the nutritional status of the target group. Interventions in conservation agriculture are specifically designed to optimise agricultural production for better nutrition outcomes and they are effective. Interventions already encourage the use of biofortified crops. The orange fleshed sweet potato (OFSP) promoted by ProSecAI/FANSER have increased production and household's intake of vitamins. The cultivation of **cassava** and its processing in Togo provides income and needs to be evaluated in Zambia[66].

In both regions, only a minority of the households engage in **gardening**. In Eastern Province the accessibility of water is a critical factor for gardening, especially in the dry season. Communities and individuals cannot afford irrigation technology, and only few people own land close to streams and rivers. In Togo´s Maritime region, land availability is limited due to high demographic pressure, limiting the capacity to produce vegetables as the production of staples is prioritised. If the consumption (and production) of vegetables shall increase, more awareness of the nutritional benefits is needed. In addition, access to water and agricultural inputs (fertilizer, seeds, and plant protection methods) need to be improved.

Climatic conditions for agricultural production are more favourable in Maritime. A more humid climate allows two harvest cycles and the cultivation of a more diverse set of agricultural crops. However, this can also result in pest and disease infestation.

The **preservation of food** during the off-harvest season can help increase the nutrition diversity and resilience of the target group. However, depending on the method of preservation[67] micro-nutrients might get lost (Musinguzi, Kikafunda and Lukwago, 2010; Sagar and Kumar, 2010). In Zambia, it is common to sun-dry various vegetables, while the preservation of fruits lags behind its potential. In Togo, the year-round availability of (wild) vegetables sets a high preference for fresh produce, and food is not preserved[68]. However, the year- round-availability of

[65] E.g. in Togo, the okra season is followed by the adémé season.

[66] In Eastern Province, Cassava is considered a poor man's crop and awareness needs to be raised about its benefits.

[67] The method of preparation and cooking can improve the nutrition quality of food. These steps may induce (positive and negative) changes and interactions among its constituents (Fabbri and Crobry, 2016).

[68] In Eastern Province, green leafy vegetables such as pumpkin leaves, wild mushrooms, okra are sundried. In rural Togo there is no market for preserved vegetables and fruits with the exception of chili and medicinal plants. Dried tomatoes, jute mallow and mangoes are not consumed by the rural population.

vegetables is declining due to land degradation, demographic pressure and urbanization. During the harvest, produce is sold off at (extremely) low prices or even gets wasted. This underlines the need for adequate and diverse preservation methods that prevent the loss of the produce and potentially improve both food and nutrition security and income generation.

In both regions, insufficient harvest production is coupled with **high post-harvest losses** (up to 30-40 %) and **lack of storage equipment.** Community storage systems are rare. As farmers in both regions reported a loss of trust among residents, it is unlikely that potential community storage systems will function.

Animal husbandry is not very diverse; most households rear chicken. Chicken-rearing is essential for income generation and increased consumption of animal proteins, and both programmes are promoting it. However, the outbreak of Newcastle in Petauke district led to a significant loss of chickens and jeopardized income generation.

7.2.3 The effects of the programs on dietary diversity

The increase in dietary diversity of the target group can partly be attributed to the FANSER and ProSecAl interventions. However, local diets in the project regions still rely strongly on **maize**, which lacks micronutrients, and supplementary food items are not always available. When addressing household food insecurity, it is essential to include **children** as important contributors to household's dietary diversity, i.e. through the collection of non-timber forest products (McGarry and Shackleton, 2009; Pouliot, 2015). As McGarry points out "children are not passive onlookers but adaptive participants" and should therefore be considered in interventions to improve household's food security and the nutritional status of its members (Mc Garry, 2008).

Animal products are a major source of protein and micro-nutrients. The **consumption of meat** is low, and meat is mostly only consumed during festive occasions. For many resource-poor households in the project regions, eating meat is (still) considered a luxury, and animals are regarded as an economic asset for crisis periods. Despite the gains in an overall consumption of animal-sourced proteins, some households still have not caught up in this regard.[69] Diverse livestock production can improve resilience to external shocks (diseases) and to climate

[69] In Maritime, this might partly be due to the beneficiary selection requirements of owning at least 5 hens and a cock and having a 10m x 10m space for the construction of a pen. This might have led to the exclusion of the most vulnerable households.

change (FAO, 2019). It has positive effects on food security income, and dietary diversity and provides additional benefits to communities (Ndiwendi, 2013).

The consumption (and especially the cultivation) of **fruits** is low. In contrast to adults (especially men), **children** consume fruits more regularly and usually as snacks between meals. **Wild foods** can improve households' nutritional status (i.e. poor households), reduce risks due to higher resistance to environmental stress, and even generate income. Despite the declining availability of **wild foods** (i.e. animals, honey, mushrooms, green leafy vegetables) due to environmental degradation (i.e. deforestation), demographic pressure (e.g. population growth, urbanisation) and the effects of agricultural practices (e.g. bush fires), wild food items remain popular in both regions and play an important role in local diets Still, some individuals lack knowledge about the nutritional value of wild foods and how to preserve them. In both project regions, **food taboos** are irrelevant.

7.2.4 WASH & Health

Health[70] is an immediate factor influencing both dietary intake and the uptake of micro-nutrients. Many women reported to suffer from diseases (i.e. respiratory diseases, malaria and diarrhoea). In 2015, diarrhoeal diseases accounted for roughly 530,000 deaths worldwide (UNICEF, 2015). The high prevalence of malaria (especially in Togo) is particularly threatening for the target group. Pregnant women face the risk of maternal anaemia, and infants born to mothers with malaria are more likely to have low birth weight (UNICEF, 2004).

"Food and nutrition security includes a sanitary, adequate health services and care […] to ensure a healthy and active life" (FAO et al., 2017). The access and availability of basic **WASH & health** infrastructures plays an important role in preventing micronutrient deficiencies, stunting and nutrition-related deaths (Gain, 2018). Half of the cases of child undernutrition is due to repeated diarrhoea and intestinal infections caused by poor sanitation and hygiene or a lack of safe water (WHO, 2019). It is estimated that **the use of clean water** and soap can prevent nearly half of all cases of childhood diarrhoea. This, in turn, can stem the loss of nutrients and reduce stunting in children under the age of five by up to 15 % (Gain, 2018). Problematically, many villages in Maritime and in Eastern Province do not have access to basic WASH & health facilities.

[70] Improved health of women is associated with an increase in perceived female authority over several farm and household decisions, suggesting that physical and mental capabilities are a crucial component of bargaining power (Anderson et al., 2017).

In Zambia, basic **patient care** is free of charge for pregnant mothers, whereas in Togo, pregnant mothers have to bear the costs of all medical treatments. The target group's access to clean drinking water is limited in both countries, and individuals (including infants, pregnant women and lactating women) occasionally drink water from contaminated sources.

Figure 13 shows the interrelation of the proposed activities meant to improve the health-status of the target group.

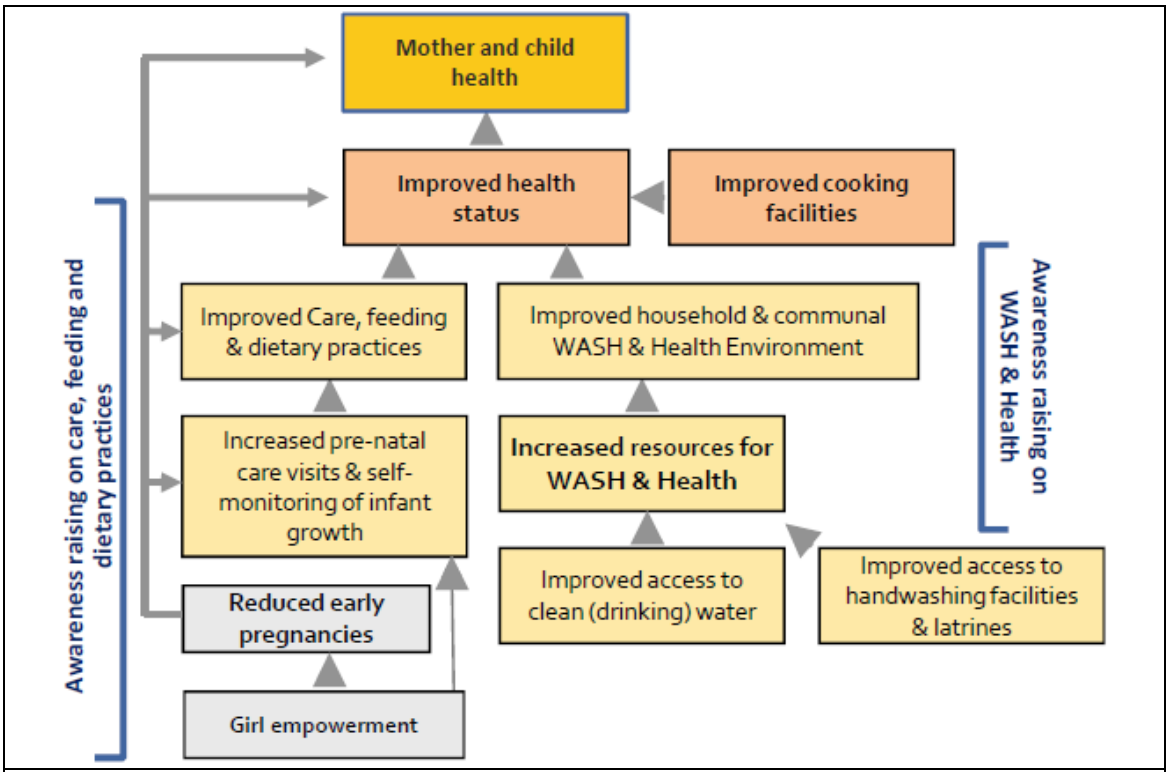


Figure 13: Measures to improve the health -status of the target group

Source: Own illustration.

As for the **access to and use of latrines,** the situation in Zambia and in Togo differs significantly. While in rural Zambia, around 33 % of the population uses sanitation facilities, less than 3 % of the population in rural Togo has access to latrines (UNICEF, 2011) and open defecation is common. Local organisations have years of experience and knowledge in the WASH & health sector (such as SNV in Zambia's **Eastern Province**, where "shaming" is used as a method to improve household hygiene, and the Eco-San latrines promoted by the Red Cross in Togo's **Maritime**).

In both regions, some **health workers and caregivers** have difficulties to **identify stunting.** This deficit can be attributed to a **lack of materials** (i.e. growth charts)

and a **lack of knowledge**. Men are the main decision-makers regarding the resources that go into the monitoring of child growth (e.g., health expenditures, transport). However, most men are unaware of the signs of stunted growth and its long-term consequences for the infant and the family, and their financial contribution is low.

The ambivalent influence of **secondary care givers** (grandmothers, siblings, fathers) on dietary intake and health needs to be addressed. Positive aspects (e.g. knowledge transfer through grandmothers) need to be accentuated, in line with the inclusion of negative side effects, as less time allocated to infants by mothers. During pregnancy and after giving birth, women consult multiple actors (public health workers but also traditional and religious authorities) on care and advice. A study from Nigeria (2016) found multiple ways in which pregnant women seek care and conclude for a strong involvement of communal structures (Akeju et al., 2016). The way young **mothers feed** new-borns has long-lasting effects on child development.[71] Insufficient breastfeeding is presumed to be related to child mortality (Black et al. 2008). Unfortunately, some mothers in both regions appear to lack knowledge about appropriate diets during pregnancy and adequate care of infants.

In this context, the high percentage of **early pregnancies** needs to be highlighted and addressed. Following a report on Eastern Province, 35.4 % of 15–19 y/o girls already have children (GZR, 2014). In Togo's Maritime (without Lomé), the number is 16.4 % (RT, 2014). Early pregnancies can have a negative impact on the health of mothers and children as both compete for nutrients (Imbuto Foundation, 2018) and this can increase the prevalence of low birth weights, preterm births and maternal anaemia (Yu et al., 2016). The fact that young mothers try to hide their pregnancy and eat less increases the risk of stunting. Accordingly, Win and her co-authors argue that "attention should be paid to improving maternal nutrition status, and especially pre-conceptual nutritional status" (Win et al., 2013). Another issue is the time- interval between pregnancies. If the interval is too small, the foetus competes with the (breastfed) infant child for their mother's nutrients.

Family planning methods (number and timing of pregnancies) can reduce pressure on food security (Smith and Smith, 2015) and has a positive impact on infant and young child feeding practices. **Child spacing** helps women's bodies to recuperate

[71] The WHO recommends that mothers breastfeed their children for six months (WHO, 2018).

and replenish essential nutrients and leads to higher birth weight for their children (Naik and Smith, 2015).

Addressing WASH & health-related issues in interventions is essential to reduce stunting. Interventions need to continue to focus on local WASH & Health conditions, especially of vulnerable groups, and involve key decision makers.

7.3 Reaching the target group

Addressing **food and nutrition insecurity** requires a multisectoral approach. Both projects apply a diverse set of interventions to communicate core messages and introduce solutions to reduce mother and child undernutrition. The interventions are informed by the social behaviour change communication (SBCC) approach. Behaviour change is a long-term process that needs attendance and supervision and ideally targets the whole community.

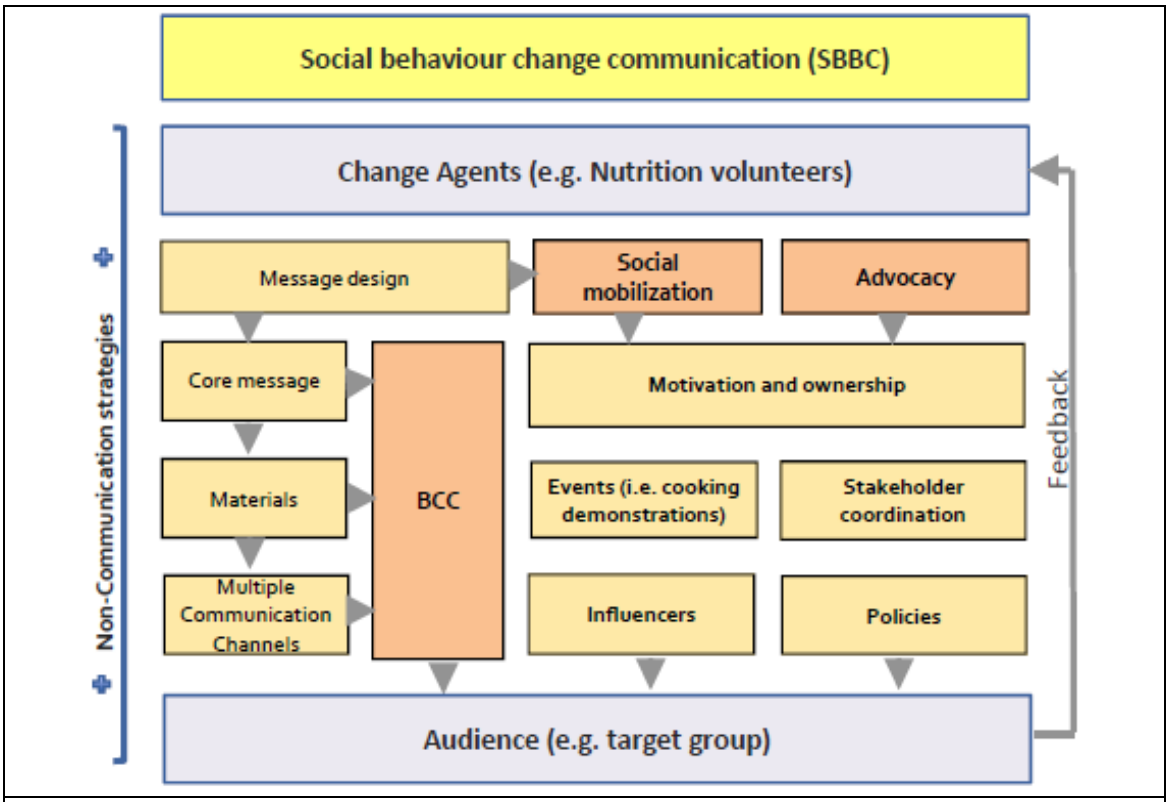


Figure 14: Social Behaviour Change Communication with Key-strategies

Source: Own illustration, adapted from Lamstein et al., 2014; Lasswell, 1948.

Access to information plays an important role in improving the livelihoods of rural populations by keeping people abreast of information that empowers their productive and logical decisions (Olaniyi and Ismaila, 2016). In analysing communication processes, the involvement of the sender and recipient of messages are important (Figure 14). Motivation and dedication of volunteers and the target groups' willingness to participate are essential for success. It is important that interventions implement project activities based on evidence and consider cultural aspects. In both project regions, the cooking demonstrations are an adequate multi-sector approach to improve the nutrition status of the target group (Box 33).

Box 33: Cooking demonstration to reach the rural population

One of the core interventions was the introduction of cooking demonstrations. These participative and repetitive activities help individuals develop micronutrient-rich eating habits. The demonstrations have proven successful in both regions. They cultivate an environment for change and integrate local communal structures and influencers (role models, community workers, volunteers and village authorities) who help generate interest. Organisers use various communication channels – visual media, face-to-face communication and nonverbal communication strategies – to reach the target group. Two areas still need improving, however: integrating caregivers (siblings, fathers, and grandmothers), community networks (cooperatives), religious groups and institutions (health facilities, schools) and increasing the availability of local and seasonal produce that is affordable for all households.

Source: Own data.

The **volunteer structures** differ within the SEWOH programme and the project regions.[72] The volunteers are responsible for project outreach and they are in direct contact with the target group and the communities. The volunteers receive compensation in different forms (i.e. bicycles, per diems). However, some

[72] In Togo, for instance, AE and AT extension officers are responsible for implementing interventions of ProSecAl and compensated by the project with a small salary. Volunteers appear to be very motivated and well trained.

volunteers stated that the programmes activities are time-consuming and conflict with their own farm work. Volunteers of the ProSecAl and the FANSER programme are highly respected and can be considered as influencers of the communities.

Ensuring the continued motivation of the volunteers is key for the success of the programme. Besides volunteers, media (e.g. posters, brochures) and media channels (radio, cell phone, internet) as well as community mobilization events are additional sources of information on nutrition and dietary behaviour.

Targeting vulnerable members of households

In designing the interventions, it is essential to consider vulnerable members of the communities and local power structures. In practice, interventions often have difficulties to reach the most vulnerable families and individuals in regard to malnutrition (i.e. widows, grandmothers left alone with the grandchildren, people living with HIV, women living with disabilities[73]).

Within the communities, organisations, social structures and individuals have impact on the nutrition status of the target group. Programmes should evaluate the involvement of additional individuals and groups who influence the care and nutrition decisions of households.

[73] People living with disabilities are often excluded in society and face significant barriers regarding their access to quality education, basic health care and employment (WHO, 2018). Women are still discriminated against in many African countries, particularly with regard to land rights (FAO, n.d.). Women with disabilities often do not have access to reproductive healthcare or healthcare for their children (WB, 2016).

8 Recommendations

A variety of organisations and researchers have proposed innovative recommendations on how to improve food and nutrition security of rural households. The following chapter provides recommendations[74] and entry points to further improve the food and nutrition security of selected target groups.[75] The recommendations of this study extend existing quantitative data by providing a qualitative perspective of social, respectively behavioural aspects of the determinants of food and nutrition (in-)security of rural households[76].

The recommendations put a special focus on the target group, but also on individuals that wield significant influence on food and nutrition security. Particular consideration was given to interventions that have the potential to reduce women's work-burden.

In the determination of the causes of undernutrition, gender is a multi-sectoral cause and does not only require gender-sensitive interventions, but also political agenda-setting on a communal, regional and national level. Besides addressing the determinants of food and nutrition security, the first section dedicates on the communicational and social aspects of the interventions to underline on how stakeholders can address a comprehensive set of interventions.

8.1 Addressing change through communication

The GIZ's country programmes are using the SBCC approach with a comprehensive set of interventions to address the causes of undernutrition. SBCC strategies can be broken down into three key categories:

1. **Behaviour change communication** (communicating with the target group)
2. **Social mobilisation** (getting the local community involved)
3. **Advocacy** (creating a supportive environment). Important actors in this communication process are the volunteers and the target group, the audience.

[74] The team acknowledges that the proposed recommendations, entry points and relevant project tools may already be in use or may have certain limitations due to financial, temporal or operational constraints.

[75] Statements that refer to specific local contexts are indicated accordingly.

[76] This research was conceived prior to the publication of the quantitative results of the follow-up studies by the cooperating partner; accordingly, their findings are not considered in this study.

Drawing on household data and expert interviews, the following communication measures can help accelerate the projects outcomes.

The volunteers and target group as the actors

Local authorities and volunteers play a crucial role in healthy nutrition behaviour[77], and their motivation is key to guarantee the success of interventions. Table 48 proposes incentives to strengthen volunteers' commitment.

Table 48: Compensation for volunteers

Material and non-material compensation for volunteers	
Material compensation	Implementing agencies could compensate volunteers for their transport costs and phone credit to stay in contact with the target group. Other measures include vouchers for agricultural inputs (i.e. seeds and fertilizers) and the distribution of bags with (additional) training materials for the volunteers. Motivation can also be strengthened to give out bonuses for well-performing volunteers.
Non-material compensation	Organisations can offer additional training for volunteers in areas of health, agriculture and nutrition[78]. In addition, volunteers can be rewarded with vocational trainings that qualify them in areas outside of the project (i.e. project management, grant applications, media literacy), and given certificates and awards.

Source: Own data.

Selecting beneficiaries

The selection process of the target group must be open to scrutiny. Table 49 proposes measures of selection to expand the project's reach.

[77] They can implement prevention measures and act as a link between nutrition and health associations, between villagers and households, and between health care service providers.

[78] Volunteers in Petauke are given bicycles. One proposed method to raise motivation and create a potential source of income for volunteers is to train them in bicycle repair.

Table 49: Selection of beneficiaries	
Selection process	
Consideration of vulnerability analysis in the villages to reach households severely affected by FNS. Local authorities can be involved in the determination of selection criteria and the identification of especially vulnerable households.	
Reach beyond the target group	
Especially vulnerable groups	Stakeholders need to consider vulnerable groups inside and outside the primary target group (e.g. women living in polygamous relationships, widows, people living with disabilities, people suffering from HIV /Aids and single mothers and adolescent girls).
Other caregivers	Besides mothers, other caregivers (i.e. siblings, grandmothers and fathers) should be encouraged to participate in the programme activities. By strengthening the participation of family members, this measure can make the family environment a place for behavioural change. Programmes can design special interventions for secondary care givers to reach them
Continued focus on children	Most interviewed experts stressed that involving children beyond the 1000-day window is crucial in many ways: Children are especially vulnerable to food insecurity. Children can also influence their parents' and siblings' dietary decisions. Ultimately, they are the parents of tomorrow.
Source: Own data.	

8.1.1 Behaviour change communication

Successful dietary behaviour change requires participatory communication and repeated exposure to community messages. Volunteers need to continue interacting with the target group in face-to-face discussions and communicating the project's message via various channels.

Dissemination via multiple communication channels

Constant exposure to information on healthy nutrition helps individuals to turn awareness into habit. Appealing **audio-visual media components** can be an effective means of communication: in areas with access to internet and mobile phones, audio-visual campaigns have proven popular and exert a noticeable pull-effect.

When designing a communication strategy, programme managers need to consider that many localities have no network coverage or electricity and that women often do not own mobile devices and are (media) illiterate.

Communication channels such as **radio**[79] **and audio and text messages sent via mobile phones** are a cost-effective means to reach the target group. Content can also be sent to community influencers that are literate and own devices. Other communication channels include **video messages** using electronic extension (e-extension) services[80] to improve agricultural knowledge and **printed media** to provide information to communities and households. Local experts should create flyers, images and posters using local languages.

Message design

The programme's collaboration is an effective means to share the core message and accelerate outcomes. Interventions where this has worked include cooking demonstrations, farmer field schools (Togo), and initiatives that encourage locals to sell their crops at local markets. Table 50 outlines the development of adequate and appealing materials for disseminating core messages.

Box 34: Local success story

Healthier children through dietary diversity

Many mothers reported that their children were less sick after adapting a more diverse diet. As a result, they saved money otherwise spent on medicines. These local/regional success stories can have a huge impact on changing dietary behavior.

Source: Own data.

[79] The number of households who own a radio is in decline. People are now using cell phones to listen to the radio. Ownerships of mobile phones in rural households is likely to increase (WFP officer).

[80] E-extension is the delivery of extension services using the internet and the latest information communication technologies (ICTs), which allow networking, online sharing, and collaboration. It can improve the effectiveness and efficiency of extension services.

Table 50: Development of communication materials		
Designing communication materials		**Example**
Clear	Content needs to be easy to understand, so that beneficiaries and volunteers can grasp concepts quickly and easily. Lessons on FNS need to be clear and simple.	For example: "fast" ways of reducing the likelihood of stunting. Creating "win-win" messages or displaying "worst-case scenarios".
Appealing	Messages should be appealing to a wide range of beneficiaries through an illustrative and eye-catching design.	E.g. chitenge/pagne and dinner plates: Traditional fabrics and kitchen items like plates (as awards) with information on healthy food items/diverse meals can strengthen dedication and sharing key messages.
Referential	Programmes design posters that refer to the distinct community (Box 34, Box 36), including individual success stories and name the direct benefits. For instance, a leaflet with the recipe of the month could be distributed to individual villages.	For instance: dietary diversity increases the child's chances of attending university. Or: dietary monotony can increase the risk of infection in children.
Adapted	Cultural and traditional relevant materials, designed by local experts (including regional and cultural preferences).	Development of information posters with locally available food items for municipalities and hospitals.
Accessible, available and affordable	Printing materials on popular items such as chitenge / pagne, plates and fabric bags increase visibility, as will the increased availability of additional materials for the volunteers, households and beneficiaries.	The distribution of informative growth charts to lead farmers, influencers and role models. GC include dietary diversity information and highlight important incentives for families to adopt a more diverse diet. GC can be painted on lead farmers' houses or communal buildings (i.e. schools, local health centers).
Source: Own data.		

8.1.2 Social mobilisation

To enhance a community's willingness to participate in the project and to increase mobilisation, all parties must encourage local influencers to share the programme's message (Table 51). Community events such as meetings, cooking demonstrations

(Box 35), organised discussion and cultural activities can help raise awareness and induce participation on a larger scale.

Table 51: Involving the community	
Involving the community	
Interactive community meetings	**Communities should be encouraged and supported to organise events** (e.g. theatre, themed songs, live performances, sport competitions) that bring people together and act as a local platform to represent the project's core message. Some examples include a FANSER/ProSecAl soccer tournament, health and body fitness programmes, regional/village food fairs and existing popular interventions that represent the project's core message such as cooking demonstrations.
Community conversations	Regular meetings (with the local authorities and influencers involved) give beneficiaries a place to share stories, raise concerns and discuss challenges[81]. Direct participation creates a sense of being an active part of the project. Meetings are also an instrument to monitor activities, **gather feedback** and consider improvements.
Identification of key stakeholders (influencers)	Implementing agencies should continue to identify **key stakeholders** (teachers, clerics, health centres, local authorities, policymakers, etc.) who design, plan and implement campaigns. The profound involvement of local authorities can help increase credibility and create incentives to extend participation.
Local management committees	Community based interventions need a management system.
Source: Own data.	

8.1.3 Advocacy

Local and regional key stakeholders are key in creating a comprehensive communication campaign and in raising awareness for core issues. The involvement of authorities creates a supportive environment and promotes good practices.

[81] Within this context, ProSecAl already evaluates technologies/crops/recipes within the communities.

Box 35: Expanding the reach of cooking demonstrations

Cooking demonstrations as regional community tournaments (e.g. Petauke vs. Katete; Kara vs. Maritime) could increase the project's regional visibility. The tournament could then become a public platform to transmit the programme's core messages. Competition could test who can cook the most nutritious breakfast for infants or best meal made form soy. The prizes could improve other health issues. For instance, a new mud stove would tackle the issue of environmental degradation and respiratory disease. The programme should involve local media and regional stakeholders in award ceremonies.

Source: Own data.

Advocacy of food and nutrition security within the political environment is essential. FANSER successfully drives mainstream food and nutrition security on a regional level and facilitates multi-sectoral stakeholder coordination. ProSecAl is part of the thematic stakeholder group that defines the multisectoral nutrition and food security policy in Togo (Table 52).

Box 36: Promotion of recipes

The local community dish

To reflect the diversity of the local cuisine, change agents, beneficiaries and influencers can create a nutrient-rich dish using locally available ingredients to raise awareness among the target group and strengthen food and nutrition security. Ultimately, a regional recipe book can be developed.

Source: Own data.

Table 52: Advocacy	
Investing in advocacy	
Investment in Infrastructure	Communities often lack basic infrastructural investments (i.e. reparation of water wells, mills for soybeans, solar panels for charging phones). In many cases, the programmes do not have additional funds to fill these gaps. To strengthen advocacy programmes can implement training sessions for local authorities and key influencers on topics such as management practices and grant applications to finance these projects.
Mainstreaming of FNS	In Eastern Province FANSER supports agricultural Road shows (by the DNCC) and participates in Farmer Field Days to mainstream food and nutrition, health and WASH issues in public events that are often dominated by agricultural topics. These activities are very popular and can be extended. Other implementing agencies can adapt these practices.
Identification of Key influencers	Local authorities and key influencers know of the problems and need solutions, their participation in the projects is crucial.
Source: DNCC; own data.	

8.1.4 Promotion of diverse dietary intake

It is not only important to strengthen people's capacity to diversify their agricultural production but also to increase their awareness of their and their children's daily dietary needs. The SBCC strategies described above should be used to promote both. The value of a diverse diet needs to be stressed through cooking demonstrations, social mobilisation and peer pressure, radio and health consultations as well as education. Showing the positive effects of a diverse diet – increased likelihood of attending post-secondary education, fewer diseases and lower health-related costs – can help motivate people to increase their dietary diversity.

8.1.5 Improving agricultural farming systems

Improving household's dietary diversity requires measures that increase the diversity and productivity of agricultural systems. Interventions could put a special focus on crops for which women have more decision power (i.e. beans). Increasing yields and crop production is impeded by limited access to agricultural inputs such as water, which needs to be adressed on a political level. Programmes should strenghen community cooperatives to increase the resources of food an nutrition security. The promotion of digitalisation (Box 37) may marginalize smallholders. Table 53 illustrates interventions to improve agricultural production.

Box 37: Digitalization and food and nutrition security

Digitalization is said to have the potential to protect the environment and to increase yields. The use of data on soil conditions, nutrients and water availability, climate, and weather can help to make more accurate use of inputs. However, new technologies might marginalize smallholders who lack the capital, access and education required to take advantage of these innovations. Furthermore, data ownership and security are not yet clarified. Digitalization can also aggravate disputes over resources and jeopardize a decentralized food supply. In addition, main causes of food and nutrition insecurity such as climate change, environmental degradation, gender inequality, the lack of access to water and seeds, and poor marketing opportunities are not addressed and might fall into oblivion (Morena, 2018).

Source: Morena, 2018.

Table 53: Recommendations to improve agricultural production

Recommendations to improve agricultural production	
Farmer field schools (FFS)	The projects employ FFS to demonstrate cultivation techniques for the crops promoted. FFS can be expanded to include information on sowing techniques, appropriate planting density, seed selection, and application of fertilisers. FFSs should demonstrate the positive effects of agricultural diversity on productivity and promote the production of crops with high market value to increase income. Programmes should focus on less labour-intensive production patterns to decrease women's work- burden (Neubert et. al., 2011).
Promotion of biofortified crops	The orange-fleshed sweet potatoes (OFSP)[82] promoted by both programmes have been successfully introduced in both project regions. Based on this success, biofortification should be scaled up to improve the uptake of micronutrients. **β-carotene fortified maize**[83] and **iron-fortified beans** have a high potential of successful consumer adoption, and **β-carotene fortified cassava** could potentially be successfully introduced in Togo (Asare-Mafo et al., 2013). **Iron-fortified pearl millet** might increase the consumption of iron and zinc (Kotkany et al., 2013).

[82] OFSP has certain limitations; it is seasonable and difficult to transform and preserve.

[83] In Zambia however, sensitisation on the health benefits of orange maize needs to be increased as it was sparsely adopted during previous programmes.

Farmer business trainings	Farmer business trainings can encourage farmers to produce and process marketable and micro-nutrient-rich crops. It is important that new crops have a reliable and profitable market and can be easily preserved and processed. Soy, for instance, was chosen by many farmers due to its market price, simple processing and preservation, and high consumer demand
Soil management	Extensive and locally adapted trainings on soil management (e.g., soil testing, the adequate use of fertilizers, erosion control, soil quality management) can be beneficial in both project regions. Unfortunately, the "special initiative soil protection and rehabilitation for food security" programme led by the BMZ is not active in either of the regions (GIZ 2019).
(Semi-) cultivation of wild foods	The (semi-) cultivation of wild foods is another way to increase the availability of rich dietary resources (such as wild vegetables, mushrooms and protein-rich insects like caterpillars). Amaranth is a promising example, though its popularity needs to increase.[84] However, some wild and semi-wild food items (e.g. honey and mushrooms) are susceptible to contamination (i.e. through trace metals like Cd, Pb) and careful chemical analysis is required to assess health risks (Interview SNV).
Oxenization	Oxenisation can contribute to food and nutrition security by increasing agricultural productivity and compensating the lack of labour force. Furthermore, it can provide income from meat and breeding. However, veterinary services and access to land and credits need to be assured (Neubert et. al.). In **Maritime**, however, land is limited, and husbandry of oxen is not traditionally practised.
Source: Asare-Mafo et al., 2013; GIZ 2019; Kotkany et al., 2013; Neubert et al., 2011; own data.	

Increased consumption of wild products

The promotion of NTFPs (e.g. at the programme's cooking demonstrations, farmer business schools, primary and secondary schools) can raise awareness about nutrition and health and show how sustainable land management can create an abundance of NTFPs[85]. Cooking demonstrations that involve **traditional foraging techniques and recipes** from grandparents and other older relatives are also useful to promote the consumption of NTFPs (Figure 15, Box 38).

84 Amaranth is included in seedling packages, but many farmers still consider it a wild herb, hence its lack of popularity. The same goes for the plant's seeds, which farmers do not consume.

85 During trainings, implementation agencies should address the need of environmental protection to sustain reproduction of NTFP.


Figure 15: Wild foods

Source: Private.

Horticulture production

To increase the availability and consumption of **fruits and vegetables**[86] and to increase horticultural cultivation (Figure 16, Table 54), programmes need to address current challenges like all-year round water availability and lack of arable land.


Figure 16: Rainwater harvesting methods

Source: Private.

[86] The introduction of Moringa in Zambia's Eastern Province needs to be evaluated, as Moringa is presumed to be vulnerable to pesticide contamination from cotton farming.

Table 54: Recommendations to increase vegetable production	
Ways to improve cultivation and consumption of micro-nutrient rich food items	
Community seed banks	Even though seed-saving is a practice that farmers have been doing for centuries (FAO, 2014), farmers in both regions have difficulties to access seeds Communal seed banks increase seed availability and are an effective tool to diversify staple and vegetable production. Ideally, these locally managed seed banks include traditional and modified seeds to strengthen farmer's resilience and to contribute to a diverse diet.
School gardens	Pilot programmes cooperating with teachers and school directors can teach pupils about gardening practices and nutritional values. Obstacles might be a lack of funding, space or inputs. Harvested vegetables can be prepared with the pupils. A study from South Africa shows that school gardens can contribute to a positive attitude towards gardening and vegetable and fruit consumption (Sunette et al., 2017)
Promotion of protein-rich vegetables	In order to increase the consumption of protein, interventions need to continue to raise awareness of the value of diverse protein-rich plant-based foods such as soy, cowpeas (already popular) (Odhong, 2016), chickpeas (desi) and lentils.[87]
Micro-nutrient rich fruits and vegetables	Pumpkins are grown in both regions. They are rich in vitamin A, easy to store and their leaves are useful as well (their seeds are also rich in zinc). Moringa is part of the interventions in the ProSecAl project in Togo and could be suitable for Eastern Province. Okra (rich in vitamin C and magnesium) is common and popular in Togo and sun-dried in Zambia. Chard is rich in vitamin A and vitamin C and might be suitable for cultivation in Eastern Province. Beet root is believed to be beneficial in treating anaemia. Banana, papaya and orange are rich in micro-nutrients and grown in both regions.
Alternative gardening systems such as bag or container gardens	In the light of pressing water issues in Zambia, interventions should promote micro-scale alternatives to vegetable gardens such as container- or bag-gardens that do not require much water nor space (Interview Tikondane)
Source: FAO, 2014; Odhong, 2016; Sunette et al., 2017; own data.	

[87] Women shown a variety of different grains, including lentils, expressed surprise. They said that the grains were cultivated once but were no longer used (PRA Zambia).

The programme´s interventions include the promotion of gardening, for example the promotion of keyhole gardens in Zambia.

However, the following barriers impeded the use of key-hole gardens: (1) Destruction of seeds/seedlings and vegetables by grazing livestock; (2) limited financial resources (resulting in poorly constructed or defective key-hole gardens; (3) limited access to land and water (Figure 17).

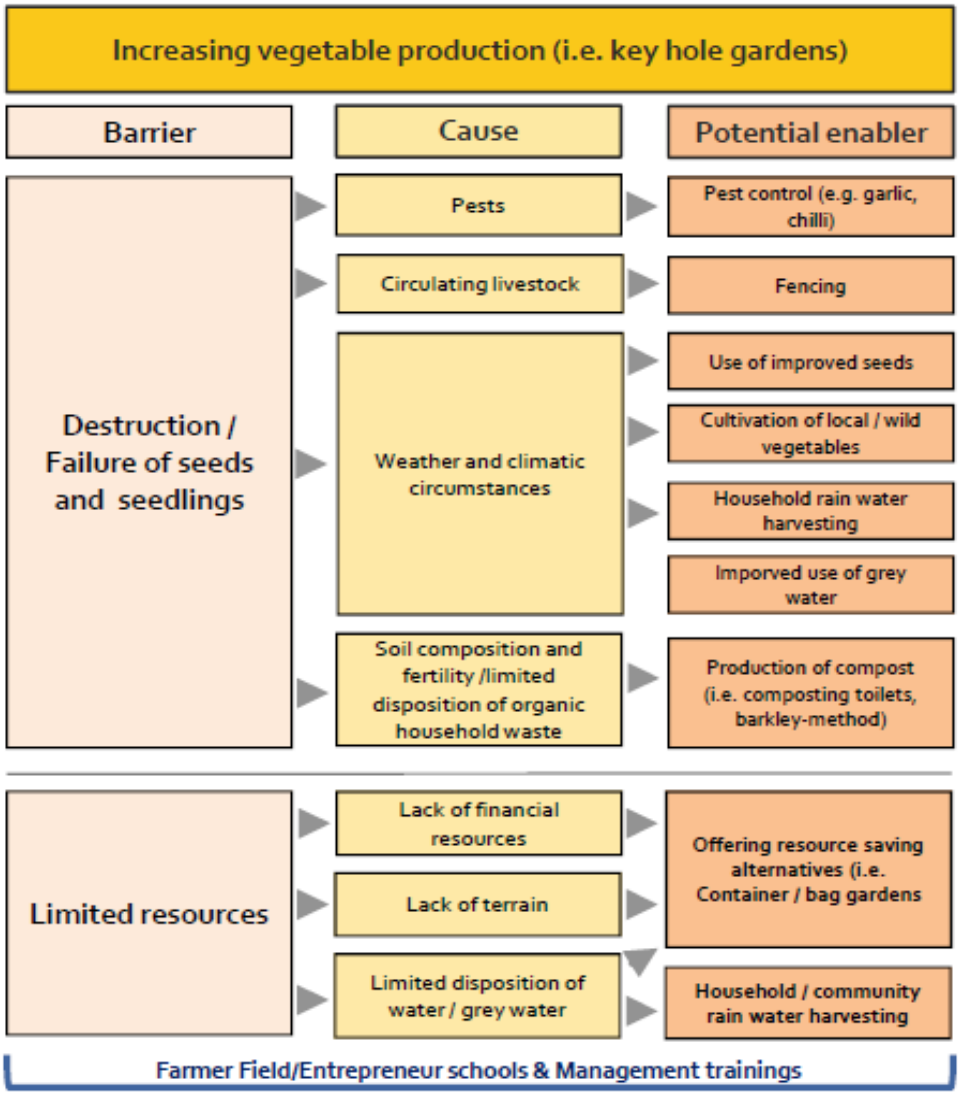


Figure 17: Barriers and enablers of keyhole gardens

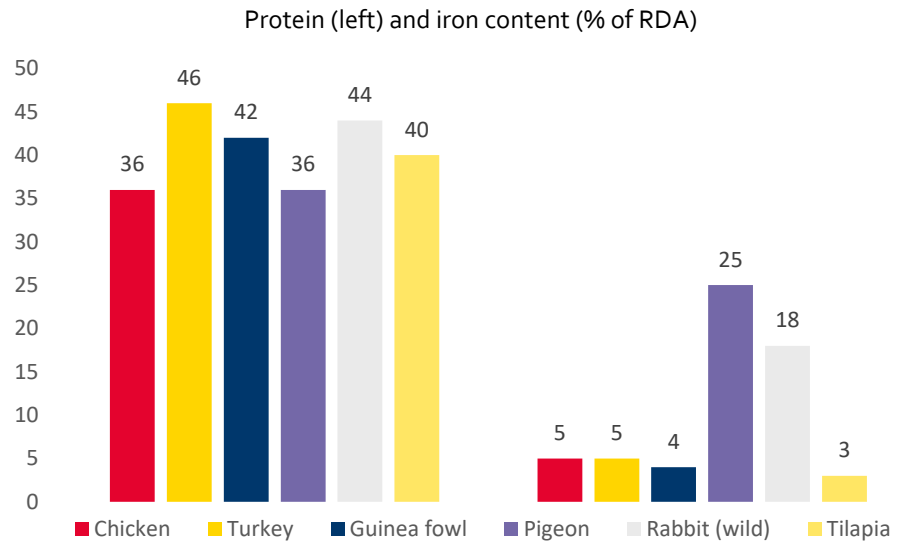
Source: Own illustration.

Consumption of animal protein sources

Livestock and dried fish are a major source of proteins and micro-nutrients such as iron (Table 55).

Chicken-rearing can help increase the consumption of animal protein and generate income and is promoted by both programmes. Trainings on breeding and animal welfare can improve disease control (e.g. use of vaccines) and provide the necessary knowledge and materials for locals. It is important that all chickens receive a full set of vaccinations.

Table 55: Content of protein / iron in % of the RDA of selected livestock



Source: USDA

Diverse livestock production (Table 56): Guinea fowls, pigeons and rabbits are rarely reared by farmers in both regions and have much untapped potential to increase the consumption of animal protein (particularly because rabbits and pigeons are not in direct competition with humans for food). Rearing of turkeys, guinea pigs, and giant grass cutters can further diversify household livestock production (Menz, 2014).

Table 56: Diverse livestock production	
Diverse livestock production	
Guinea fowls	are typical and popular in Togo's Maritime region and known in Zambia's Eastern Province. Guinea hens can lay an average of 80–120 eggs per season and are more heat tolerant and less susceptible to disease than chickens. However, they are difficult to house and are vulnerable to predation by wild animals (Ndiweni, 2013).
Pigeons	are raised in rural households in both regions. They are an additional protein source, require little time and cost investment, and do not need additional food sources. Farmers indicated that pigeons can be sold to be used for delicacies and in voodoo practices, but their reproduction rate is very low (FGD).
Rabbits	have a significant potential to improve household diets and contribute to income generation. Rabbits are easy to transport to markets, their pelts are useful, they require little input and labour and their meat is low in fat and rich in protein. Furthermore, their reproduction rates – with up to 40 offspring a year – are very high (FAO 1999). However, the risks of diseases are elevated, and rearing requires training. Furthermore, rabbit farming faces cultural resistance despite its benefits.
Source: FAO 1999; Ndiweni, 2013; own data.	

Evaluation of the potential of fish and small-scale aquacultures

In both project regions, experts shared the view that **fish and small-scale aquacultures** (Table 57) had high potential for income generation and food and nutrition security. While fish farming is uncommon in both regions, the adoption of small-scale aquaculture could help alleviate poverty and improve rural household's food security (FAO, 2014; Mudenda, 2006; Musuka and Musonda, 2012).

Increasing food security through storage and preservation (Table 58)

Income generation rationales should figure in agricultural transformation efforts. That is to say, the crops selected for processing should have a profitable and reliable (local) market (e.g. soy tofu; gari in Maritime, see Box 38, and cowpea sausages in Eastern Province). Targeting village markets is beneficial not only for the seller, but also has the advantage of increasing the number of consumers of nutritious products.

Table 57: Fish-farming in the project regions

Potential of fish and small-scale aquacultures
The potential of fish-farming in the Maritime region is high when it comes to small-scale aqua-cultures for tilapia, catfish, and African Aworana (heterotis niloticus). The region has a favourable climate, precipitation, and soil characteristics. Fish is popular and has good market prices. Fish- farming could help generate additional income and improve the population's livelihood. However, Togo's aquaculture sector suffers from a lack of supervision, funding and fishery policies (FAO, 2014; PNUD, 2007). In addition, demographic growth and land-use conflicts might pose barriers to successful implementation of fish- farming (RFI, 2008).
In Zambia's **Eastern Province**, fresh fish is scarce due to a lack of perennial streams and lakes. The region's temperatures and rainfall patterns are not favourable to fish farming: 99% of the streams dry up by the end of August. Unsurprisingly, the province has some of the lowest numbers of registered fish farmers in the country. As in Togo's Maritime, fish is primarily used for private consumption. Women and children use lines and hooks to catch small quantities of various fish species However, small-scale aquafarming in small water bodies (SWBs) has economic potential, and the absence of commercial fisheries creates a huge opportunity for small-scale producers. The adoption of small-scale aquaculture could help alleviate poverty and improve rural household food security (Gellner et al., 2019).
Source: FAO, 2014; Gellner et al., 2019 ; PNUD, 2007; RFI, 2008.

Box 38: Production of gari

Fermented Cassava

In Togo, cassava is processed into gari, and commonly consumed in the off-harvest season. This processing of cassava could strengthen dietary resilience in Eastern Province. Gari is a dry, crispy and creamy-white powder made from crushed and fermented cassava roots. The nutritional value is increased through the fermentation process. Processing reduces transport costs, post-harvest losses of fresh cassava roots and increases market value (James et al., 2012).

Source: James et al., 2012.

Table 58: Increasing food security through storage and preservation	
Processing and storage techniques	Processing and storage techniques can be taught in FFS or during cooking demonstrations. Preservation methods that could be promoted in Eastern Province include traditional shade-storage of pumpkins[88], storing cowpeas, mung beans and Bambara nuts in pods, sacks, clay pots and drums (for up to two years) and mixing burnt manure and wood with pearl millet, cowpeas, mung beans and Bambara nuts to keep away rodents and pests (RSA, 2016).
Community storage systems	Community storage systems (in combination with microcredit programmes) can strengthen resilience. These systems help farmers to reduce post- harvest losses and the pressure to sell at low market prices. However, famers reported a loss of trust among residents, which decreases the likelihood of functioning community storage systems. Furthermore, farmers said that in some seasons, yields are too small for storage. To strengthen resilience, communities can establish emergency storage systems. Ideally, the systems are run by local authorities and reserved for vulnerable households.
Sealed bags	Sealed bags PICS (Purdue Improved Crop Storage) are a safe and economic way to reduce grain storage losses for smallholder farmers. They are suitable for a wide variety of crops (Baoua et al., 2014; Baributsa, 2014).[89]
Source: Baoua et al., 2014; Baributsa, 2014; RSA, 2016; own data.	

8.2 Improving care, WASH & health

The health status of children is directly influenced by the care, feeding and dietary practices of mothers and other caregivers (e.g. siblings, grandmothers, and fathers). However, many caretakers have difficulties to allocate time to their children, especially if they are sick.

Access and availability of WASH & health facilities can help prevent diseases and improve their well-being (Box 39).

[88] Shade preservation of pumpkins is a common practice (pumpkins can be stored for up to twelve months). Pumpkins are extremely rich in vitamin A.

[89] These crops include rice, maize, sorghum, groundnut, sunflower seeds, pigeon peas, beans and mung beans. PICS are used in Togo, but farmers reported crop failure when storing seeds in the PICS.

Box 39: Water as a core issue

Access of water as a multi-sectoral issue

Water scarcity is a multi-sectoral problem that affects food and nutrition insecurity on many levels. The increase of agricultural production depends on access to and availability of water. Access to water is also essential for community projects, household activities and personal hygiene, communities should be empowered to acquire funding and grants for infrastructure projects from other programmes and donors (such as social protection programmes by the world bank).

Source: Own data.

It is crucial that key influencers are identified and employed in programme activities supporting WASH & health. For instance, traditional healers and clerics can deliver important messages in their prayers, and hygiene demonstrations can take place during community events (e.g. church meetings, sport matches).

The following sections outline possible strategies to improve (1) prenatal care and growth-monitoring (2) household sanitation and hygiene.

8.2.1 Improving care

Improving care: Monitoring child growth

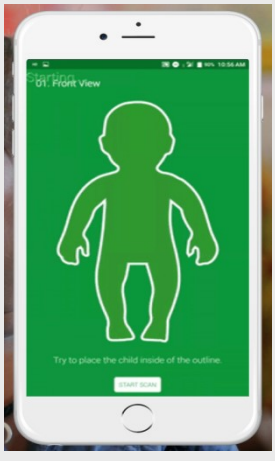
The monitoring of child growth facilitates the early diagnosis of growth abnormalities. Ideally, health workers and care takers measure an infant's development regularly. Table 59 describes actions to detect stunting in early life.

Table 59: Monitoring of child growth	
Improving monitoring of child growth	
Raise awareness	Identifying determinants that lead to stunting requires extensive training. Health workers, volunteers and key individuals require repeated and bottom-up training sessions on the causes and effects of stunted growth.
Focus on decision makers	Raising men's (and male siblings) awareness for the necessity of regular growth monitoring (Box 40). Men are the main decision makers on health and transport expenditures. ***Pères lumières*****,** dedicated fathers who serve as role models by taking their children to the doctor for examination, can have a positive influence on men's self-understanding and positively change their role within the family.
Distribution of growth charts (GC)	Giving GC to target groups, individuals and communities: This will help them to measure the growth of infants. GC can be printed on paper for individual households or painted on the walls of health centres, houses or public buildings such as schools. There are also new technologies available to detect undernutrition, but they may not be employable in the two project regions (Box 40).
Source: Own data.	

Box 40: Accurate intelligence

Accurate Intelligence to detect undernutrition

The Welthungerhilfe and Microsoft developed an AI-powered smartphone app called Child Growth Monitor (CGM). The app uses an infrared sensor scan to capture 3D measurements of a child's height, body volume and weight to detect malnutrition. This modern form of child monitoring has high potential; however, data protection needs to be ensured. Furthermore, network coverage and smart phone usage is rare in both project regions. Alternatively, clinics can use these tools (Microsoft 2019). On the right, the application (Child Growth Monitor 2018).



Source: Microsoft, 2019; Child Growth Monitor, 2018.

Improving care: Increasing the number of care visits

The frequency of care visits is especially low in Togo and requires improvement.[90] In Zambia, increased dietary diversity of children is correlated with a higher frequency of care visits. Awareness can be raised in the following ways (Table 60):

Table 60: Increasing the number of care visits

Recommendations to increase the number of care visits	
Involve decision makers	Men often control the resources that enable women to visit health centres (e.g. paying for bills, transport, time). **Both fathers and mothers** need to be made aware of the importance of these visits. This will empower women and increase men's awareness
Creation of synergies	Local organisations and their partners show a high level of expertise in raising household awareness on nutrition related topics.
Identification of influencers	Pregnant women frequently consult local influencers (e.g. priests, teachers, traditional healers) for advice. Cooperation with local influencers can help tailor interventions to local needs.

Source: Own data.

[90] By contrast, most women in Zambia attended the care visits. In Zambia, care visits are free of charge, while in Togo, they cost money.

Improving care: Household hygiene

The establishment of **handwashing facilities** (equipped with soap and running water) is restricted by defective equipment, lack of direct access to water, and high costs. Paired with a lack of knowledge on personal hygiene, this promotes the spread of infectious diseases. Table 61 proposes measures to improve household and community hygiene.

Table 61: Recommendations to improve hygiene

Measures to improve household and community hygiene	
Increase communal availability of water	Communities need to find ways to increase **water availability.** The promotion of **communal rainwater harvesting** (i. e. from churches and schools) can increase the availability of water. The placement and regular maintenance of handwashing facilities in schools can reduce the incidence of infection and disease.
Maintenance	Improve maintenance of **handwashing stations**: Robust **tippy taps** equipped with soap (also soap alternative such as ash) should be placed near latrines, cooking facilities and schools. Work together with schools and assign children to take care.
Raise awareness	Local communities must understand the interrelation of handwashing, household hygiene and undernutrition if they are to implement hygiene practices and **increase spending on hygiene products**.
Focus on children	Special focus should be placed on children (who are directly affected by poor hygiene and who function as role models for younger siblings) and local leaders (as role models and multiplicators).

Source: Own data.

8.2.2 Access to and use of latrines

Table 62 describes recommendations to improve hygiene and sanitation.

Table 62: Recommendations to improve hygiene and sanitation

Improving hygiene and sanitation	
Construct sanitation facilities	Support households to construct simple and affordable latrines. As experiences from other projects show, traditions, family structures, the number of users, distances and the availability of local materials need to be considered. One example of a successful toilet design is the Eco-San latrine, which is currently used by the DRK in the project region as part of the BMZ SEWOH programme.
Raise awareness for children	Children are especially vulnerable to and highly affected by inadequate hygiene. It is crucial that training programmes for children and their key influencers (e.g. teachers and directors) take place at communal schools.
Other measures	Measures to improve hygiene include burying faeces in shallow holes and the use of natural products for personal hygiene. For instance, in Zambia, maize cob is used as toilet paper. It is subsequently burnt, which ensures waste disposal.

Source: Own data.

8.2.3 Access to clean drinking water

Several measures improve access to clean drinking water[91] on household and community level (Table 63), and thereby reduce women's work-burden:

Table 63: Improving access to water on a household and communal level

Household level	Community level
(1) Use fire after cooking to boil untreated water from unclean sources (2) Place clean (treated) drinking water in covered containers in the sun to purify (3) Use solar disinfection to purify water (4) Make households aware of the links between hygiene and health, and that healthier children with fewer episodes of diarrhoea and microbe reduction can reduce hospital costs (5) Encourage households to wash fruits/vegetables (6) Incite people to spend money on WASH to reduce spending on health treatments	(1) Cooperate with partners (other national or international organizations, governmental agencies) to build/repair new wells. (2) Introduce collective and communal filter systems (3) Create maintenance funds through donations and water committees (4) Evaluate local water access, create an incentive system (e.g., timetables would save time) (5) Reduce mistrust of aqua tabs and establish a system for funding aqua tabs. (6) Promote community champions and WASH committees, which would also reduce the workload of women

Source: Own data.

8.2.4 Respiratory diseases

Many women (and infants) in the project regions suffer from respiratory diseases. Smoke emitted from indoor stoves using solid fuels (e.g. coal and wood) is believed to increase the mortality rate of children. Outdoor cooking has the potential to reduce child mortality by 9 % (Langbein, 2017). It is necessary to raise awareness of the effects of indoor air pollution on respiratory health, especially with regards to infant health (infants are often carried on the back of their mothers while cooking). Cooking demonstrations are an effective method to address the negative health effects of household air pollution. A possible entry point could be the promotion of alternative cooking devices such as improved stoves.

[91] In line with the recommendations, the testing of water sources by certified bodies is essential. Results can be shared within the communities and health risks can be illustrated.

8.2.5 Early motherhood

Early motherhood affects child growth in various ways. The number and timing of their pregnancies influence the household's food security (Smith and Smith, 2015) and child feeding practices (Naik and Smith, 2015). Table 64 proposes interventions to prevent early pregnancies by empowering girls.

Table 64: Recommendations to empower girls

Recommendations to empower girls	
Reaching young girls	Key influencers are needed to reach young girls, who are particularly vulnerable. They must stress the importance of girl's school attendance. Teachers in Eastern Province reported that girls who become pregnant early are more likely not to attend school.
Female role models	Train local female role-models that girls can relate to as key influencers (e.g. teachers, school directors, nurses) to address the consequences of early pregnancies
Involvement of boys	Involve boys in awareness raising about the impact of early pregnancies and their responsibilities.

Source: Own data.

9 Conclusion

This study builds on the UNICEF-framework on maternal and child undernutrition (2015) to determine the influencing factors of mother and child nutrition. It uses the Social and Behavioural Change Communication (SBCC) approach by Lamstein et al. (2014) to evaluate respective social and communication approaches.

Taking the findings from this research and from other studies, a set of recommendations was developed.

The findings highlight that the causes of food and nutrition insecurity are multi-sectoral, interrelated and heterogeneous. This research revealed many similarities of the determinants of undernutrition in Zambia's Eastern Province and Togo's Maritime. The findings indicate promising improvements in the reduction of stunting by addressing gender, income generation and water as key drivers on a multi-sectoral level. These factors are potentially also applicable for the other country packages.

In both regions, insufficient agricultural production paired with post-harvest losses and lack of preservation and transformation limit the availability of food. In the light of population growth and climate change, agricultural productivity needs to increase.

As preservation methods and storage systems are largely lacking, agricultural output in both projects regions is strongly determined by climatic conditions. The seasonality of agricultural production does not guarantee sustainable income throughout the year, and results in the yearly reoccurrence of the so-called "hungry season", a phase of chronic hunger lasting several weeks to several months. During this period, women and children suffer the most. To effectively reduce stunting and to ensure food and nutrition security, immediate actions and joint efforts of stakeholders are needed to break this vicious circle of hunger, undernutrition and poverty.

In order to fight the periodic shortage of food, stakeholders need to promote measures to increase yields, improve market access, create opportunities for income-generation, and increase water availability. In doing so, rural households can decrease their subjection to external factors that threaten their livelihood.

However, sustainable change is often restricted by political and socio-economic deficits. While both governments address food and nutrition security through national policies, they do not achieve the desired effect. Remote communities and vulnerable households have difficulties to access the programme benefits and

extension services. Policy- makers need to ensure that the programmes improve the situation of vulnerable households in particular.

Increasing agricultural production in Eastern Province has the potential to contribute to food and nutrition security. However, agricultural production is low due to limited market access, low availability of transport, and untapped ground water sources. While the region possesses vast groundwater sources that have the potential to increase agricultural and horticultural production, they are still unused by the communities.

In contrast, demographic pressure in Maritime limits the possibility to extend farming activities and requires an immediate increase of productivity per hectare, the reduction of post-harvest losses and an increase in food processing. Additionally, young adults lack opportunities and perspectives; underemployment is high and young adults seek alternative employment opportunities beyond traditional agricultural activities. Refinement of agricultural goods and a strong focus on trade and handicraft can generate income and perspectives for the communities.

Furthermore, WASH-related determinants jeopardize the target group's health status, particularly in Maritime. Child undernutrition is strongly related to repeated diarrhoea and intestinal infections caused by poor sanitation and hygiene.

The discrimination against women manifests, among others, in unequal consumption of micronutrients. Women (especially during pregnancy and lactation) and their children do not have a sufficiently diverse diet, although they have a special need for micronutrients. Infants and children are most affected by undernutrition and deserve special attention during, but also after the 1000-day window of opportunities. Older siblings and care takers have a strong influence on infant development, and their knowledge on nutrition and dedication is essential for future change. Furthermore, due to their immense workload, many women have difficulties to allocate additional time to care for their children and to generate income. In both project regions, early motherhood is prevalent and poses nutritional risks for the mother and the unborn. However, only few programmes aim at empowering young girls to prevent early pregnancies.

In addressing undernutrition in line with interventions, stakeholders apply the Social and Behavioural Change Communication (SBCC) approach. In the target group, the team observed an improved food and nutrition status of beneficiary households versus non-beneficiaries. Within the communities, the programmes' volunteers are influential ambassadors of food and nutrition security. Despite their dedication, they have difficulties to make their own ends meet and require support.

In order to achieve nutrition security, individuals need to adopt healthy eating habits. However, changing dietary habits and behaviour takes time and strongly depends on a household's available resources.

In both regions, child stunting is declining slowly, and still prevalent. Implementing agencies face the challenge of having to urgently improve household's food and nutrition security while creating a sustainable social and physical environment that enables change. This research proposes diverse and multi-sectoral recommendations and entry-points to improve the nutrition situation. In order to sustain change and improve the well-being of mothers and children, stakeholders need to join forces to create a coherent and favourable environment of change.

Many households face challenges they cannot control for - the degradation of land, climate change, rising or unpredictable prices – which jeopardise their agricultural production, income, and food and nutrition security. These issues can only be addressed by joint efforts on national and global levels.

Overall, this research illustrates that the basic, underlying and immediate causes of undernutrition are interrelated and complex. The analysis shows that it is indispensable to see the bigger picture of food and nutrition (in)security to accelerate the reduction of stunting. Many households have extremely limited resources, which only allows for few changes in their dietary behaviour.

There is no single and unique 'silver bullet' in the battle against child stunting. Rather, development interventions need to consider the multiple dimensions of food and nutrition (in)security. This requires prioritising gender-, nutrition- and income-sensitive agriculture, as well as climate change mitigation strategies. In addition, economic growth and strong governance on communal and regional level play an essential role in facilitating nutrition interventions. Ensuring a sufficient and diverse food supply and generating perspectives for the youth in a rapidly growing population and under the effects of a changing climate demands considerable and innovative efforts of everyone involved.

10 Glossary

Piece work, barter trade and petty trade

Barter denotes the direct exchange of food and/or non-food items without using money and is common within local communities**. Petty trading** denotes small-scale trading of inexpensive items (i.e. purchasing large quantities of a product at retailers and selling it at local markets or in villages). **Piece work** denotes employment in which a worker is paid a fixed rate for each task or unit produced. This form of employment is not permanent.

Beneficiary and non-beneficiary village

Within this study, beneficiary villages are those villages in which the activities of the programmes are implemented. Self- explanatory, non-beneficiary villages do not benefit from the programmes. During empirical research, the team visited six beneficiary and six non-beneficiary villages in both project regions. **Beneficiaries** refers to individuals that directly benefit from the interventions of the programmes.

Project regions

The project regions in this study are the districts of Petauke and Katete in Eastern Province in Zambia and the Prefectures of Bas-Mono, Vo and Yoto in the Maritime Region in Togo.

Currencies in the two project regions

The Zambian currency Zambian Kwacha (ZMW) was introduced in 2013 and has an exchange rate of 1 EUR to 11,8 Kwacha and 1 USD to 10.1 ZMW [92]In Togo, the official currency is the West African Franc CFA (Communauté Financière d'Afrique). The CFA is issued by the BCEAO (Banque Centrale des États de l'Afrique de l'Ouest-Central Bank of the West African States). Its exchange rate is fixed at 655,957 CFA to 1 EUR [93]

[92] https://www.oanda.com/lang/de/currency/converter/, last accessed Aug 25th 2018

[93] https://www.bceao.int/, last accessed August 2018

Hungry season / periode de soudure

Food (and nutrition) insecurity is usually predictable as it follows cyclical patterns of inadequate access and availability of food (FAO, 2008). In this context, times of food shortage are often referred to as **hungry / lean season**.

Food Security

Food Security is "a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO et al., 2017).

Food and Nutrition Security

In addition to food security, the term nutrition security denotes the "secure access to an appropriately nutritious diet coupled with a sanitary environment, adequate health services and care [...] to ensure a healthy and active life" (FAO et al., 2017).

Malnutrition

Malnutrition in general is "an abnormal physiological condition" that occurs through abnormal consumption or mal absorption of macro-and micronutrients that are essential for normal body function. Under- and overnutrition are forms of malnutrition. *Undernutrition* is caused by an insufficient nutritional intake or absorption and *overnutrition* is the consequence of an excessive food intake above body requirements (FAO et al., 2017).

Stunting

Stunting refers to the condition of a child who is too short for his/her age. Stunting is the failure to grow both physically and cognitively and is the result of chronic or recurrent malnutrition. Its effects often last a lifetime (WHO, 2015). Stunted children commonly suffer from repeated infection, damage to mucous membranes, reproductive disorders, eye damage (blindness), anaemia, and increased risk of severe morbidity from common childhood infections such as diarrhoea and measles.

Wasting

Wasting refers to the condition of a child who is too thin for his/her height. Wasting is the result of sudden or acute malnutrition due to a lack of food intake or severe diseases. Wasted children face an immediate risk of death (WHO, 2015).

Complementary Feeding

is defined as the "process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk" (WHO, 2018). The recommended period ranges from 6 to 24 months of age, even though breastfeeding may be continued beyond.

Hidden hunger

Hidden hunger denotes the chronic lack of vitamins and minerals and might not be visible. Hidden hunger occurs when people's diet does not meet their nutrient requirements (WHO, 2015).

Dietary Diversity

Dietary Diversity denotes a wide variety of foods containing macro- and micronutrients, which ensure a balanced diet for a healthy life without taking food consumption frequency into account (WFP, 2008). Dietary Diversity can be measured with different indicators such as the following:

Individual Dietary Diversity Score (IDDS) reflects how adequate a diet of the respondent is (Kennedy, Ballard, and Dop, 2010). In this study, it consists of seven food groups for children aged 6-23 months and ten food groups for women (IDDS-W). *Minimum Dietary Diversity (MDD)* is defined as the minimum intake of four food groups by children 6-23months (MDD) and five food groups by women (MDD-W) (Kennedy et al., 2017).

Minimum Acceptable Diet (MAD)

MAD is an indicator measured in the global programme. It is determined by MDD and Minimum Meal Frequency (MMF) of breastfed and non-breastfed children. MMF for breastfed children is achieved when they consume two meal/days when 6–8 months of age or 3 meals/day when 9–23 months of age. Non-breastfed children achieve the minimum when fed four times /day when 6–23 months of age. Meals are defined as both meals and snacks other than breast milk (WHO, 2008).

Food Insecurity Experience Scale – Household Level (FIES-H)

The FIES-H is a statistical measurement scale to measure the observed severity of food insecurity at the household level (FAO, 2015).

Rural household

A rural household is defined as a semi-subsistence farm household that participates in both production and consumption of commodities.

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12 Annexes

12.1 Micro-nutrient deficiency

Overview on micro-nutrient deficiency		
	Functions	**On a global scale**
Vitamin A	Deficiency results in growth retardation, damage to mucous membranes, reproductive disorders, eye damage (blindness). For children, deficiency is related to anaemia, impaired growth, and increased risk of severe orbidity from common childhood infections such as diarrhoea and measles. Pregnant women with vitamin A deficiency may be at increased risk of preterm birth (Radhika et al., 2002).	Approximately 30 % of preschool-age children are vitamin A deficient, and nearly 5.2 million preschool-age children suffer from night blindness. Over 19 million pregnant women in developing countries are also vitamin A deficient.
Zinc	Zinc is essential to more than 200 enzyme systems, human growth, the maintenance of body tissues, sexual function, vision, and the immune system. Zinc deficiency related to childhood infections include diarrhoea, pneumonia, and possibly malaria. Zinc supplementation decreases the risk of preterm birth.	Inadequate zinc intake is estimated above 25 % in sub-Saharan Africa. Stunting is commonly used as a proxy to estimate risk of zinc deficiency in a population.
Iron	Iron deficiency during childhood and adolescence impairs mental development and learning capacity. In adults, it reduces the ability to do physical labour. Severe anaemia increases the risk of women dying in childbirth.	Iron deficiency is the most common micronutrient deficiency in the world and a leading cause of anaemia. The prevalence of anaemia is used as an indirect indicator. Anaemia affects 800 million women and children globally.
Source: Gernand et al., 2016; Harvest Plus, 2018; WHO, 2019.		

12.2 Programme description SEWOH-packages

12.2.1 Fanser

german cooperation

Implemented by giz

Global Programme
Food and Nutrition Security, Enhanced Resilience

Food and nutrition security in Zambia - FANSER

Context

Despite its political stability and past economic growth, Zambia is still characterised by high levels of poverty and unemployment. Rural areas are particularly affected, with 75 percent of the population considered to be living in poverty. The agricultural sector primarily consists of small (up to 5 ha) and medium-sized (up to 20 ha) farms that mostly engage in the production of maize. Clearly not enough emphasis is placed on the production of diverse, nutritious foods or on local added value. Impoverished households are strongly affected by the lack of a varied diet and live mainly on maize. This affects the children above all, as is evident in the prevalence of stunting (low height for a given age). With a stunting rate of 40 percent among children under 5 years of age, Zambia is one of the world's hardest hit countries. Food and nutrition insecurity is particularly grave during the period prior to the next harvest, i.e. between December and March, as during that time rural households have used up their own harvests and must purchase food in the marketplace.

Activities in Zambia

- The FANSER project aims to establish and implement food and nutrition committees at the district level. In the Katete and Petauke Districts, these committees will implement the 'First 1,000 Most Critical Days' Programme which is supported by the Scaling Up Nutrition (SUN) initiative.
- At a different level, the FANSER project aims at directly improving the hygiene and food and nutrition situation of women and young children. Food processing, for example, ensures that people have access to sufficient food even in difficult times. This includes the correct processing and storage of products, such as tomatoes. In this context, particular emphasis is placed on dietary diversification.
- A further objective of the FANSER project is to make successful approaches a permanent feature in the country. Positive experiences are conveyed to governmental and non-governmental institutions. To this end, much emphasis is placed on cooperation with partners in the SUN initiative and other donors. Publications as well as a follow-up are being prepared to ensure that this successful approach will continue to be taken beyond the end of the project.

Our objective

The project's aim is to ensure that food and nutrition insecure people in Zambia's Katete and Petauke Districts, and in particular women of childbearing age and young children, have access to sufficient and healthy food at all times, including times of food crises.

12.2.2 ProSecAl

coopération allemande

Implemented by giz

Global Programme
Food and Nutrition Security, Enhanced Resilience

Multisectoral Food Security in Togo

Context

Maize is the most important staple food in Togo. It is cultivated in large quantities, yet many people - especially women and children are malnourished. Vitamin- and micronutrient-rich foods are often not grown in home gardens or not affordable to purchase in the markets. Many people are lacking knowledge on how to prepare meals properly and the specific nutrition requirements for women and young children. In addition, access to clean drinking water and public health services and other institutions is limited. Harmful hygiene practices, such as the renouncement of hand washing continue to be widespread. Women of childbearing age and infants under two years are in particular vulnerable. They suffer from undernourishment and malnourishment. The project in Togo therefore focuses on a holistic approach targeting food and nutrition insecurity.

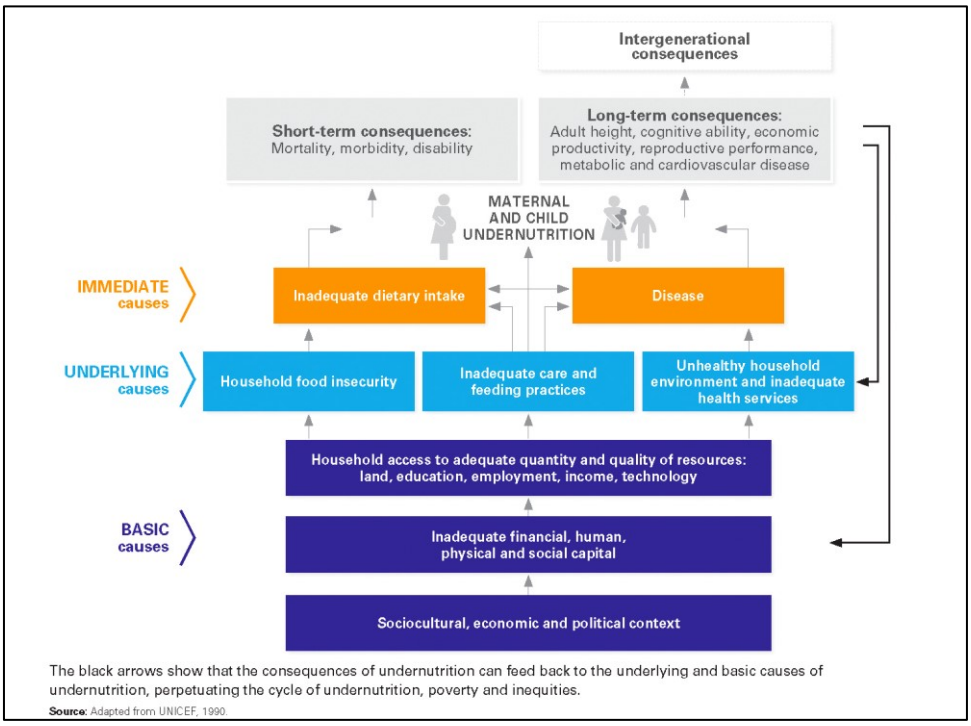
Activities in Togo

- Public and private health and agricultural advisors receive training in nutrition, basic hygiene and the diversification of food production.
- In target-group-oriented lessons, participants are taught practical knowledge, e.g. through cooking demonstrations or planting of vegetable gardens. Information on important hygiene practices are also passed on.
- Women are educated in the cultivation of crops and livestock, which play a minor role in the traditionally starch-rich diet (such as soy, peanut, chicken and vegetable crops). They receive information about new storage and drying methods, increasing the availability of high quality food throughout the year.
- The "Food and security, enhanced resilience" project is a major contributor to the Togo Food Action Plan, which forms part of the national agricultural strategy. The program also contributes to the national strategy on nutrition and supports the implementation of the *Scaling Up Nutrition* (SUN) initiative.

Our Objective

The diet of 6,500 women of childbearing age and 2,200 young children (six to 23 months) in the Maritime region in Togo has improved - through a better and more varied diet.

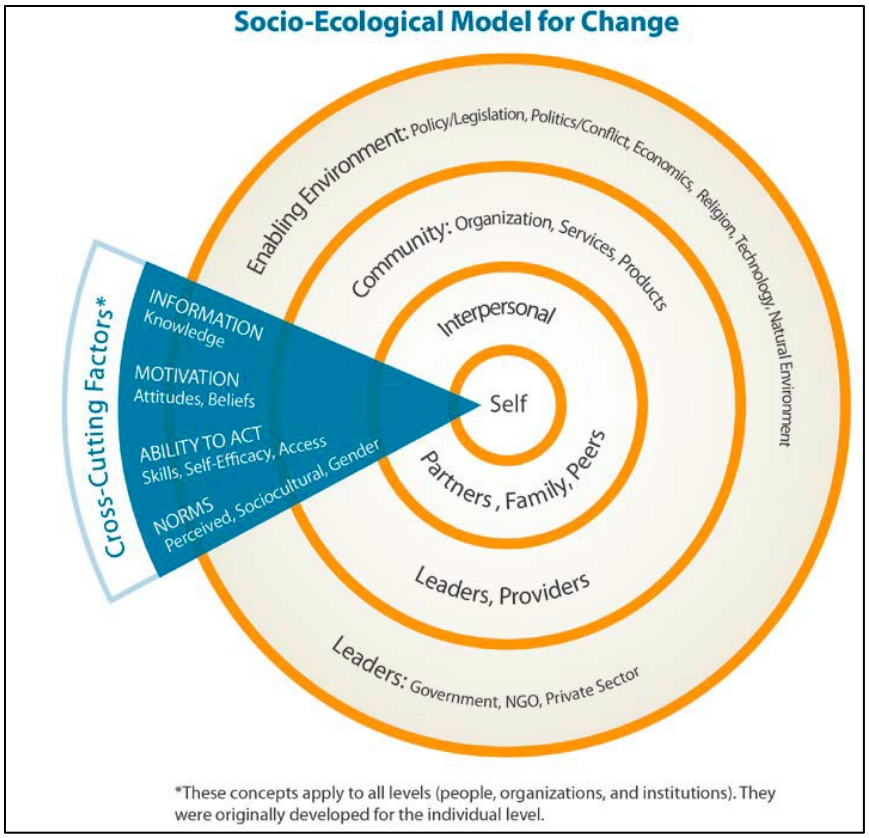
12.3 UNICEF Framework Maternal and Child undernutrition



The black arrows show that the consequences of undernutrition can feed back to the underlying and basic causes of undernutrition, perpetuating the cycle of undernutrition, poverty and inequities.

Source: Adapted from UNICEF, 1990.

12.4 Social-Ecological Model for Change



*These concepts apply to all levels (people, organizations, and institutions). They were originally developed for the individual level.

12.5 Conducted expert interviews and memos

Country	District / Province	Organisation
Zambia	Lusaka	Deutsche Kreditbank für Wiederaufbau (KFW)
Zambia	Lusaka	Kickstart (NGO)
Zambia	Lusaka	African Development Bank
Zambia	Lusaka	International Fund for Agricultural Development
Zambia	Lusaka	United States Agency for International Development (USAID)
Zambia	Lusaka	SNV Netherlands Development Organisation
Zambia	Lusaka	Harvest Plus
Zambia	Lusaka	Innovations for Poverty Action
Zambia	Lusaka	World Food Programme (WFP)
Zambia	Lusaka	Red Cross Zambia
Zambia	Chipata	GIZ (FANSER)
Zambia	Katete	Farmers Union Katete
Zambia	Katete	CARE international
Zambia	Katete	DNCC - District Nutritonalist
Zambia	Katete	Ministry of Agriculture (Marketing Officer)
Zambia	Katete	Farmers Union (Katete)
Zambia	Petauke	Catholic Relief Service (CRS)
Zambia	Petauke	Microcredit Institution (local)
Zambia	Petauke	PASME Radio
Zambia	Petauke	Petauke Hospital (Doctor)
Zambia	Petauke	DNCC Petauke (Chairperson Communication & Advocacy Working Group)
Zambia	Katete	TIKONDANE Community Centre
Zambia	Chipata	Community Markets for Conservation
Zambia	Katete	Priest
Zambia	Katete	CARE international (NGO)

Zambia	Katete	SNV Netherlands Development Organisation
Zambia	Katete	Religious leader
Zambia	Katete	Board - Ministry of Cultures and Traditions
Togo	Lomé	School (Teacher)
Togo	Tsévié	ICAT
Togo	Lomé	Ministry of bilateral Cooperation
Togo	Lomé	Expert: Agriculture, politics, value chains
Togo	Lomé	Institut Togolais de Recherche Agronomique (Togo) 1
Togo	Lomé	MOPIB
Togo	Lomé	GIZ/GFA (ProCIV)
Togo	Vogan	Nurse at communal hospital
Togo	Lomé	Institut Togolais de Recherche Agronomique (Togo)
Togo	Lomé	GIZ/GFA (ProSecAl)
Togo	Vogan	Health Worker / Agent de Santé (ASC)
Togo	Lomé	Ministry of Agriculture
Togo	Lomé	Kolping Togo
Togo	Vogan	ICAT
Togo	Lomé	GIZ/GFA (ProCIV)
Togo	Lomé	DAHW (Deutsche Lebra und Tuberkulose Hilfe)
Togo	Lomé	GIZ (ProDRA)
Togo	Tsevie	Deutsches Rotes Kreuz (SEWOH)
Togo	Lomé	GIZ/GFA (ProSecAl)
Togo	Tsevie	Agide (local NGO)
Togo	Lomé	Food and Agricultural Organization (NGO)
Togo	Lomé	Institut Togolais de Recherche Agronomique (Togo) 3

12.6 Results of the quantitative analyses

Table A: The undernourished household in Eastern Province

	Variable	Sample Mean / Share of Sample (n=400)	Sample Standard Deviation	Minimum Acceptable Diet (MAD=NO)	Minimum Acceptable Diet (MAD=YES)	Women Minimum Dietary Diversity (WMDDS=NO)	Women Minimum Dietary Diversity (WMDDS=YES)	Undernouished HH (HFIES= Moderaterly or severly food insecure)	Non-Undernourished HHs (HFIES= Mildly food insecure /food insecure)
Household char.									
	No. of HH members	5.76	2.21	5.83	5.66	5.92	5.64	5.77	5.75
	Males HH heads	86 %	0.35	87.45 %	82.96 %	87.86 %	84.58 %	87.70 %	82.67 %
	Married monogamous	74,5 %	0.44	76.04 %	71.11 %	77.46 %	72.25 %	76.74 %	70.67 %
	Married polygamous	9.25 %	0.29	87.45 %	10.37 %	9.82 %	8.81 %	6.97 %	12.67 %
	Age of mother (in years)	26.72	7.01	26.79	26.58	27.42	26.18	26.14	27.61
	Education total (in years)	3.54	3.21	3.51	3.57	3.0	4.0	3.72	3.32

	Age of child (in days)	448.33	154.57	451.06	441.62	442.27	452.93	440.73	458.85
	Improved drink. water source (dry)	74.25 %	0.44	73.38 %	76.30 %	73.99 %	74.45 %	71.72 %	78.67 %
	Improved drink. water source (wet)	76.25 %	0.43	74.14 %	80.74 %	73.99 %	77.97 %	74.59 %	79.33 %
	Access to Land	98.75 %	0.11	99.24 %	97.77 %	98.84 %	98.68 %	98.36 %	99.33 %
	Cultivating (Home-Garden	34.00 %	0.47	33.84	34.81 %	35.26 %	33.04 %	33.61 %	35.33 %
Income Sources									
	Crops	92.23 %	0.26	92.78 %	91.04 %	91.33 %	92.92 %	92.18 %	92.67 %
	Business	37.24 %	0.48	34.80 %	42.42 %	31.33 %	42.74 %	40.34 %	31.34 %
	Animals	14.88 %	0.36	15.2 %	14.51 %	10.30 %	18.35 %	15.61 %	14.26 %
	Occasional labor	37.02 %	0.48	39.21 %	32.58 %	37.28 %	36.82 %	33.61 %	42.07 %
	Remittances	0.52 %	0.07	0.43 %	0.76 %	0.00 %	0.92 %	0.85 %	0.00 %
	Regular salary	4.19 %	0.20	3.61%	5.34 %	42.42 %	41.47 %	5.10 %	2.14 %
Target Variables									
Children									
	Minimum Acceptable Diet	33.92 %	0.47	-	-	20.81 %	44.00 %	37.04 %	29.53 %

	Total meal frequency	3.58	1.72	-	-	3.09	3.96	3.79	3.27
	Children Food Group Score (all children)	3.46	1.33	-	-	2.97	3.82	3.54	3.32
	Child had diarrhoea in last 2 weeks	62.25 %	0.49	62.36 %	61.48 %	65.32 %	59.91 %	60.66 %	64.00 %
	Number of clinic visits w/ child (Under 5 visits)	11.22	4.72	11.44	10.81	10.97	11.40	11.20	11.20
Women									
	Women food group score	4.73	1.31	4.43	5.27	3.51	5.66	4.94	4.43
	Women reaching Min. Food Group S.	56.75 %	0.49	47.91 %	73.33 %	-	-	63.52 %	48.00 %
Other									
	Any support in Caretaking	48.25 %	5.03963	49.04 %	46.47 %	46.82 %	49.34 %	48.77 %	47.33 %
	Receiving Nut. Counsel.	65.5 %	6.97	61.21 %	74.07 %	59.54 %	70.04 %	68.85 %	62.67 %
	HFIES Score	1.27	0.98	1.13	1.18	1.49	1.12	-	-

Data: Nutrition Baseline Survey 2015 Zambia.

The red color indicate statistically significant differences above the 95 % confidence level. Bright yellow indicates statistically significant differences at the 90 % confidence level.

Table B: Regression analysis Eastern Province (table Z2)

	(1)	(2)	(3)	(4)	(5)	(6)
	IDDS-CH ologit	IDDS-CH ologit	MMF logit	MAD logit	IDDS-W ologit	IDDS-W ologit
Breastfeeding status of children	-0.599**	-0.624**	1.250***	4.577***		
	(0.297)	(0.295)	(0.436)	(0.879)		
District (Reference: Petauke)						
Katete	-0.0734	-0.0727	-0.282	0.260	-0.391*	-0.412**
	(0.207)	(0.202)	(0.292)	(0.287)	(0.200)	(0.197)
Household Head	-0.0799	0.0221	-0.348	-0.655	0.0255	0.142
	(0.379)	(0.382)	(0.515)	(0.588)	(0.381)	(0.374)
Source of income						
Sale of crops	-0.0281	-0.213	-0.370	-0.0801	0.458	0.376
	(0.394)	(0.385)	(0.621)	(0.547)	(0.379)	(0.365)
Sale of animal products	0.116	0.161	0.334	-0.138	0.477*	0.479*
	(0.298)	(0.293)	(0.447)	(0.379)	(0.283)	(0.280)
Temporary income	-0.182	-0.219	-0.396	-0.299	-0.0782	-0.0865

	(0.214)	(0.212)	(0.316)	(0.296)	(0.209)	(0.206)
Business income/petty trade	0.341	0.427**	0.580*	0.593*	0.379*	0.427**
	(0.219)	(0.216)	(0.319)	(0.309)	(0.210)	(0.207)
Salary income	0.785	0.831	0.357	0.922	-0.163	-0.0124
	(0.528)	(0.526)	(0.819)	(0.732)	(0.503)	(0.500)
Marital status (Reference: monogamous)						
Married polygamous	0.0370	-0.0818	-0.614	0.325	0.359	0.240
	(0.379)	(0.370)	(0.507)	(0.511)	(0.375)	(0.374)
Widowed	-0.0229	-0.182	-0.753	-0.406	0.275	0.317
	(0.778)	(0.762)	(1.050)	(1.011)	(0.758)	(0.761)
Divorced or separated	-0.400	-0.377	-0.650	-1.008	0.213	0.318
	(0.502)	(0.505)	(0.644)	(0.722)	(0.485)	(0.480)
Single	0.187	0.219	-0.456	0.628	0.656	0.672
	(0.431)	(0.439)	(0.634)	(0.580)	(0.435)	(0.430)
HH size	-0.0134	-0.0223	-0.0577	-0.0774	-0.0936*	-0.0877*
	(0.0532)	(0.0536)	(0.0718)	(0.0768)	(0.0523)	(0.0520)

HFIES (Reference: Food secure)						
Mild food insecure	-0.759***		0.0713	-0.289	-0.324	
	(0.270)		(0.390)	(0.366)	(0.260)	
Moderate food insecure	-0.689**		-0.229	-0.304	-0.786***	
	(0.301)		(0.392)	(0.401)	(0.292)	
Severe food insecure	-0.921***		0.00749	-0.226	-0.693**	
	(0.357)		(0.508)	(0.562)	(0.334)	
Crop Diversity	0.0480	0.0751	0.215	-0.00299	0.164*	0.186*
	(0.104)	(0.103)	(0.143)	(0.131)	(0.0990)	(0.0977)
Household has a garden	-0.267	-0.159	-0.0871		-0.100	-0.0378
	(0.216)	(0.213)	(0.298)		(0.212)	(0.209)
Nutrition counselling						
Health surveillance assistant	0.604***	0.585***	0.386	0.714**	0.492**	0.530**
	(0.229)	(0.225)	(0.306)	(0.321)	(0.226)	(0.222)
Volunteer group	1.153***	1.193***	0.867*	1.427***	0.328	0.429
	(0.342)	(0.339)	(0.522)	(0.478)	(0.319)	(0.315)

Agricultural extension service	2.981*	3.522**	0	0	2.679	3.108*
	(1.740)	(1.720)	(.)	(.)	(1.651)	(1.640)
Other	1.912	2.483*	-1.274	1.446	1.323	1.682
	(1.496)	(1.477)	(1.061)	(0.961)	(1.103)	(1.093)
Number of times respondent went to under 5 clinic with child enrolled	0.0662**	0.0709**	0.0460	0.0356		
	(0.0287)	(0.0287)	(0.0410)	(0.0501)		
Children's age in month (Reference: 6-11 months)						
12-17	0.841***	0.835***	-0.158	1.040***		
	(0.265)	(0.262)	(0.391)	(0.385)		
18-23	1.155***	0.980***	-0.118	1.832***		
	(0.364)	(0.355)	(0.481)	(0.567)		
24+	0.858	1.037	0	0		
	(1.269)	(1.326)	(.)	(.)		
Age in years of respondent	0.0114	0.00963	0.0250	0.0178	-0.0135	-0.0193
	(0.0166)	(0.0164)	(0.0278)	(0.0250)	(0.0162)	(0.0160)
Total years of schooling	0.00190	0.0115	0.0606	0.0182	0.0647**	0.0745**

	(0.0328)	(0.0325)	(0.0488)	(0.0458)	(0.0320)	(0.0319)
Episodes of diarrhoea since child was born			-0.0674	-0.0624		
			(0.0459)	(0.0630)		
Care support						
Mother/mother in law of respondent			0.226	-0.221		
			(0.382)	(0.355)		
Older siblings of the child			-0.0363	-1.264**		
			(0.544)	(0.583)		
Father/husband			-0.156	-0.523		
			(0.457)	(0.481)		
Sister (in law)			-0.140	-0.486		
			(0.695)	(0.841)		
Constant			-0.310	-5.472***		
			(1.378)	(1.564)		
Observations	363	369	358	358	363	369
* p<0.1, ** p<0.05, *** p<0.01 **(Factors associated with MDD, based on multilevel logistic regression, N = 400)**						

Table C: The undernourished household in Maritime Region

Variable	Sample Mean / Share of Sample (n=440)	Sample Standard Deviation	Undernouished HHs(MAD =NO)	Non-Undernourished HHs (MAD =YES)	Undernouished HHs (WMDDS=NO)	Non-Undernourished HHs (WMDDS= YES)	Undernouished HH (HFIES= Moderaterly or severly food insecure)	Non-Undernourished HHs (HFIES= Mildly food insecure /food insecure)
Household characteristics								
No. of HH members	5.76	2.19	5.90	5.49	6.01	5.10	5.95	5.12
Males HH heads	93.64 %	-	93.17 %	94.52 %	93.39 %	94.26 %	92.85 %	96.15 %
Monogamous Marriages	67.24 %	-	67.23 %	70.54 %	67.29 %	71.31 %	69.23 %	68.15 %
Polygamous Marriages	30.00 %	-	30.03 %	25.34 %	30.18 %	23.77 %	28.27 %	28,84 %
Other Relationships (widowed / single)	2.6 %	-	-	-	-	-	-	-
Age of mother (years)	29.69	2.27	29.79	28.38	29.69	28.38	29.97	27.24
Education mother (in years)	2.44	2.72	2.31	2.70	2.42	2.49	2.33	2.79
Improved Drinking water source (dry season)	39.72 %	-	38.56 %	36.98 %	39.30 %	34.42 %	41.96 %	25 %

	Improved drinking water source (wet season)	37.95 %	-	41.29 %	36.98 %	41.82 %	34.42 %	44.64 %	24.03 %
	Access to Land	91.82 %	-	91.80 %	91.78 %	92.13 %	90.98 %	91.96 %	91.34%
	Cultivating (Home-) Garden	21.36 %	-	21.84 %	20.54 %	24.21 %	13.93 %	9.61%	25%
Income Sources									
	Crops	78.18 %		75.76 %	82.87 %	78.30 %	77.86 %	76.78 %	82.69 %
	Business	60.36 %		61.98 %	56. 84 %	61.19 %	58.19 %	63.28 %	50.96 %
	Animals	56.26 %		49.65 %	69.17 %	55.85 %	57.37 %	59.70 %	45.19 %
	Occasional labor	22.10 %		23.97 %	17.80 %	23.02 %	19.67 %	23.88%	16.34 %
	Remittances	22.32 %		15.06 %	36.98 %	19.87 %	28.68 %	25.97 %	10.57 %
	Artisanal work	10.68 %		12.62 %	6.84 %	10.69 %	10.65 %	9.82%	13.46
	Regular salary	1.59 %		2.05 %	0.68 %	1.57 %	1.63 %	0.89 %	3.84 %
Target Variables									
Children									
	Minimum Acceptable Diet	33.25 %		-	-	24.29 %	56.55 %	33.43 %	32.69 %
	Total meal frequency	3.27	1.69	-	-	3.06	3.79	3.25	3.30

	Children Food Group Score (all children)	3.06	1.43	-	-	2.79	3.76	3.02	3.16
	Child had diarrhoea in last 2 weeks	47.95 %	-	48.46 %	46.57 %	51.25 %	39.34 %	49.7%	42.3 %
	Number of clinic visits w/ child (Under 5 visits)	5.15	2.62	4.94	5.60	5.21	4.97	5.40	4.28
Women									
	Women food group score	3.92	1.10	-	-	-	-	3.77	4.38
	Women reaching Minimum Food Group Score	27.72%	-	-	-	-	-	22.91 %	43.29 %
Other									
	Any support in Caretaking	70 %	-	69.62 %	71.23 %	72.01 %	64.75 %	73.21 %	59.61 %
	Receiving Nutrition Counseling	64.55%	-	61.09 %	72.23 %	67.92 %	55.73 %	72.91 %	37.5 %
	HFIES Score (0= food secure, 1= Mild Food Insecurity, 2= Moderate Food Insecurity, 3= Severe Food Insecure			1.76	1.71	1.81	1.56	n/a	n/a
	Age of child (months)			13.83	14.47	14.03	14.13	14.19	13.62

Data: Baseline Survey 2016 Togo.

The red colour indicated statistically significant differences above the 95 % confidence level. Bright yellow indicated statistically significant differences at the 90 % confidence level.

Table D: Regression analysis Maritime Region

	(1) **IDDS-CH** **ologit**	(2) **IDDS-CH** **ologit**	(3) **MMF** **logit**	(4) **MAD** **logit**	(5) **IDDS-W** **ologit**	(6) **IDDS-W** **ologit**
Breastfeeding status of children	-0.373	-0.375	0.816**	3.115***		
	(0.282)	(0.281)	(0.388)	(0.832)		
District (reference: Bas-Mono)						
VO	0.0642	0.0703	-0.381	-0.440	-0.124	-0.140
	(0.244)	(0.243)	(0.328)	(0.324)	(0.239)	(0.238)
YOTO	0.309	0.334	0.167	-0.108	0.328	0.311
	(0.253)	(0.253)	(0.373)	(0.340)	(0.263)	(0.262)
ZIO	0.403	0.315	0.0408	0.705*	0.532*	0.328
	(0.287)	(0.284)	(0.376)	(0.398)	(0.285)	(0.277)
Household Head	0.259	0.384	0.203	0.551	0.215	0.324
	(0.390)	(0.387)	(0.455)	(0.532)	(0.381)	(0.379)
Source of Income						
Sale of crops	0.380	0.378	0.946***	0.554	0.174	0.143
	(0.266)	(0.264)	(0.322)	(0.378)	(0.258)	(0.254)

Sale of animal products	0.688***	0.639***	0.800***	0.744**	0.457**	0.469**
	(0.210)	(0.209)	(0.278)	(0.298)	(0.209)	(0.208)
Temporary income	-0.106	-0.216	-0.0900	-0.273	-0.0900	-0.210
	(0.224)	(0.222)	(0.307)	(0.306)	(0.221)	(0.218)
Business /petty trade	0.166	0.0989	0.671**	-0.113	0.152	0.0963
	(0.197)	(0.196)	(0.269)	(0.270)	(0.195)	(0.194)
Salary income	0.168	0.327	-0.620	-0.542	0.136	0.656
	(0.800)	(0.798)	(0.941)	(1.060)	(0.731)	(0.705)
Remittances income	1.491***	1.404***	0.360	1.019***	0.684***	0.523**
	(0.250)	(0.245)	(0.331)	(0.306)	(0.226)	(0.219)
Marrital status (reference: monogamous)						
Polygamous	0.0124	-0.0140	-0.517*	0.0773	-0.351*	-0.324
	(0.200)	(0.199)	(0.266)	(0.284)	(0.204)	(0.203)
Widowed (n=3)	-0.0894	0.189	0.397	1.328	-2.611**	-2.068*
	(1.069)	(1.054)	(1.698)	(1.580)	(1.192)	(1.178)
Divorced / seperated (n=5)	1.494*	1.396*	0.860	2.327***	1.532*	1.361*
	(0.832)	(0.817)	(1.166)	(0.882)	(0.803)	(0.773)

Single (n=6)	-0.438	-0.676	-1.136	1.011	2.008**	1.606**
	(0.857)	(0.815)	(1.092)	(0.961)	(0.780)	(0.750)
Household size	-0.0918*	-0.0894*	-0.0840	-0.197**	-0.145***	-0.154***
	(0.0477)	(0.0467)	(0.0683)	(0.0770)	(0.0466)	(0.0455)
HFIES Score (reference: food secure)						
Mild FI	-0.623		0.0444	-0.832	-0.139	
	(0.424)		(0.563)	(0.575)	(0.468)	
Moderate FI	-1.098***		-0.551	-1.078**	-1.146***	
	(0.390)		(0.492)	(0.508)	(0.433)	
Severe FI	-2.251***		-1.230	-2.905***	-2.596***	
	(0.664)		(0.831)	(1.037)	(0.658)	
Homegarden	-0.0338	-0.209	0.442		-0.354	-0.554**
	(0.224)	(0.219)	(0.333)		(0.223)	(0.220)
Received Nutrition Counseling (reference: no counselling)						
Through health services	0.526**	0.412**	0.189	0.562**	0.0500	-0.136
	(0.213)	(0.206)	(0.292)	(0.287)	(0.210)	(0.203)
Through NGOs	-0.615	-0.691	-1.070	0	-1.003	-1.075*

	(0.596)	(0.588)	(0.860)	(.)	(0.638)	(0.623)
Through media	0.812**	0.741*	-0.0595	1.065*	0.306	0.214
	(0.393)	(0.389)	(0.525)	(0.559)	(0.382)	(0.368)
Under 5 clinic visits	0.0302	0.0238	-0.0601	0.0571		
	(0.0384)	(0.0380)	(0.0495)	(0.0511)		
Control: Age brackets child (reference: 6-11 months)						
12-17	0.725***	0.674***	0.0719	0.624**		
	(0.224)	(0.221)	(0.290)	(0.305)		
18-23	0.644***	0.585**	0.708**	0.717**		
	(0.238)	(0.238)	(0.335)	(0.313)		
24+	1.334	1.115	-0.795	0		
	(1.134)	(1.130)	(1.737)	(.)		
Age of Mother	-0.00667	-0.00992	-0.0207	-0.0106	0.00440	-0.00104
	(0.0157)	(0.0156)	(0.0196)	(0.0252)	(0.0154)	(0.0153)
Years of education of mother	0.0822**	0.0807**	-0.0188	0.0849*	0.0214	0.0250
	(0.0365)	(0.0368)	(0.0486)	(0.0500)	(0.0363)	(0.0363)
Episodes of diarrhoea since birth			0.0805	0.152		

			(0.153)	(0.158)		
Support in caretaking (reference: no support)						
Mother/ mother in-law	0.108	0.0859	0.232	0.0220		
	(0.227)	(0.227)	(0.300)	(0.319)		
Siblings	0.618**	0.599**	0.859**	0.747**		
	(0.268)	(0.268)	(0.399)	(0.345)		
Other	-0.259	-0.325	-0.792*	-0.537		
	(0.343)	(0.340)	(0.450)	(0.524)		
_cons			-0.101	-4.515***		
			(1.087)	(1.287)		
Observations	435	435	435	424	439	439
Standard errors in parentheses						
* p<0.1, ** p<0.05, *** p<0.01 **(Factors associated with MDD, based on multilevel logistic regression, N = 420)**						

12.7 Research team in Zambia and in Togo

Research Team Togo

Name (Institution)	Professional Background
Dr Chuchoro (Université de Lomé)	Agronomics, Research Supervisor
Tchatchibara Ayeva (ITRA)	Monitoring and Evaluation Research Supervisor
Kossi Tete Agbéko Apaloo (ITRA)	Nutrition specialist
Essodolom Paka (ITRA)	Nutrition specialist
Déborah Badombena-Wanta (ProSecAl)	Nutrition
Holanyo K. Amevo (ProSecAl)	Evaluation
Gligbe Awovi Edem (UL)	Anthropology, Gender
Agbobli Afi (UL)	Rural Development
Kao Akla (UL)	Agricultural Economics
Tchamouza Aichatou (UL)	Agronomics
Koffi Komi (UL)	Rural Development
Duyiboe K. Emmanuele (UL)	Rural Development
Raymond Keke (ProSecAl)	Monitoring and Evaluation

Research Team Zambia

Name (Institution)	Professional Background
Dr Rhoda Mofya-Mukuka (IAPRI)	Food and Nutrition Research Supervisor
Jairos Sambo (IAPRI)	Research assistant
Kennedy Chilimboyi (UNZA)	Agricultural Economics
Charles Mwamba (UNZA)	Plant Science
Japhet Mutunga (UNZA)	Plant Science
Augustine C. Kaunda (UNZA)	Food and Nutrition
Isabel Sakala (UNZA)	Agricultural Economics
Brenda Makamba (UNZA)	Agricultural Economics
Musanda Ngulube (UNZA)	Soil Science
Mungaila H. Moment (UNZA)	Agricultural Economics

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